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The Independent Guide to IBM Personal Computers

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November 1983

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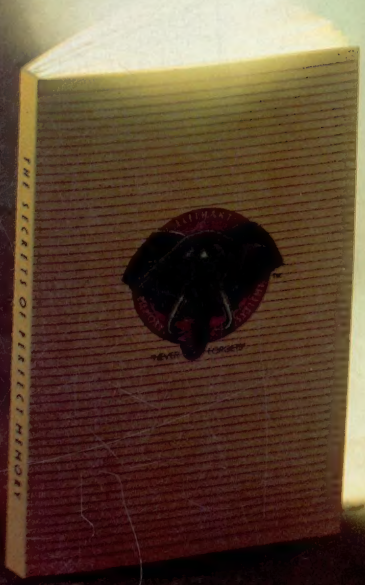
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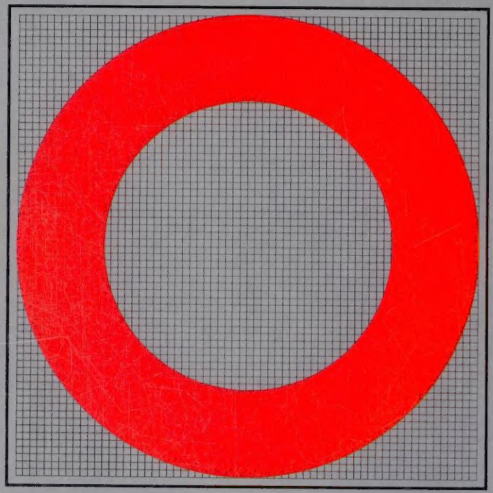
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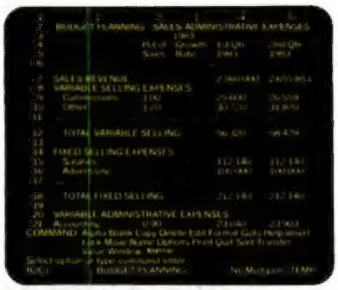
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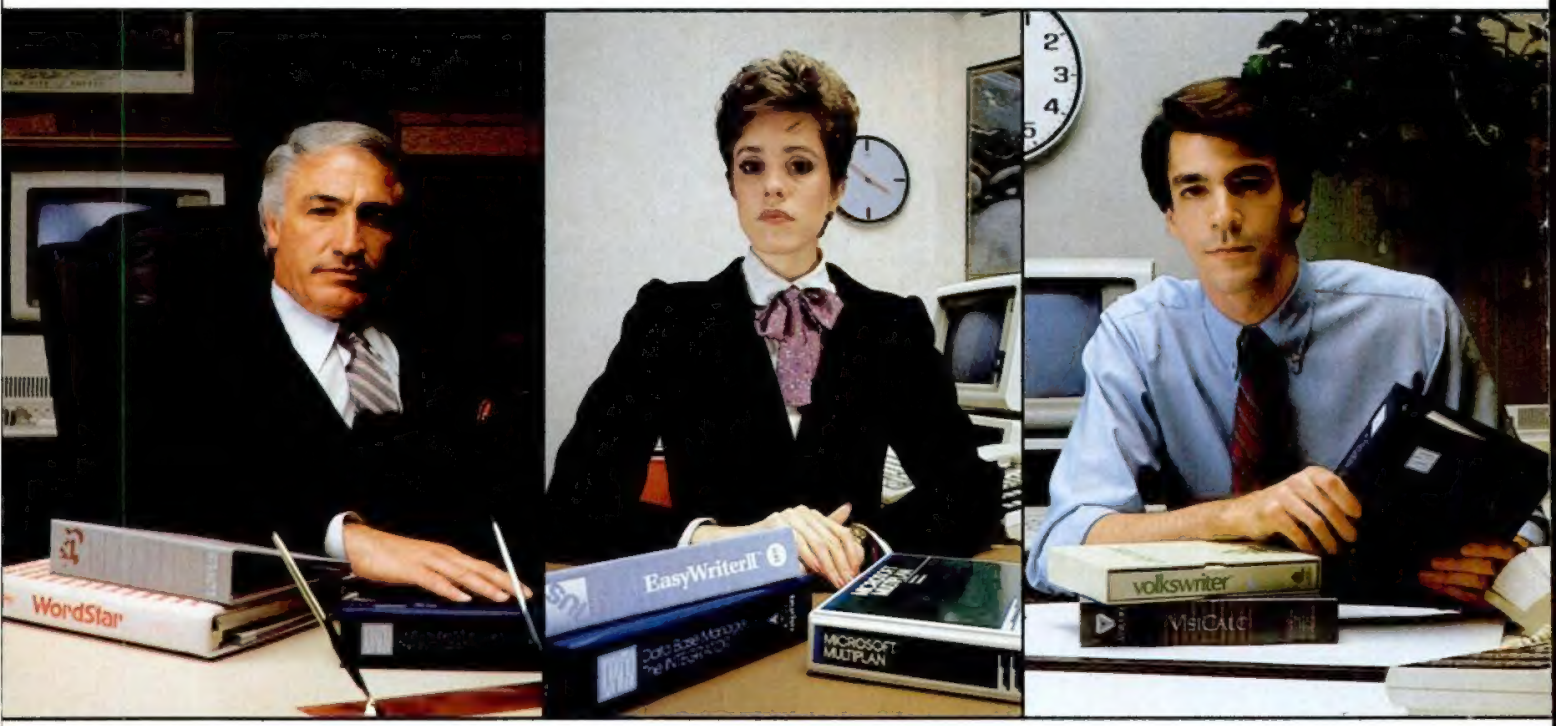
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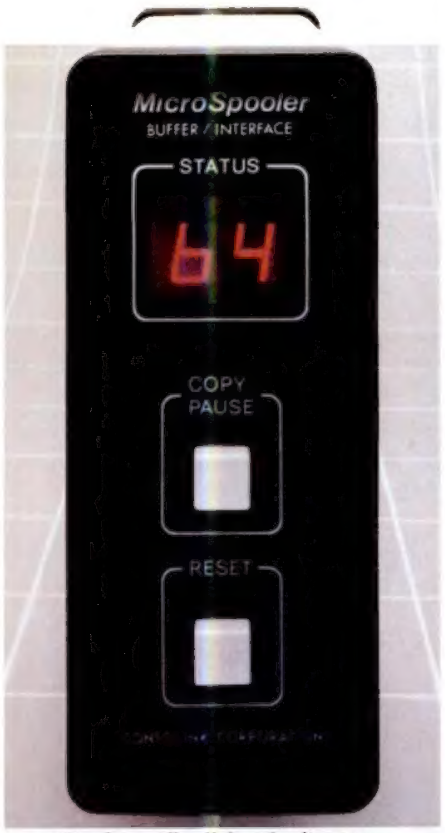
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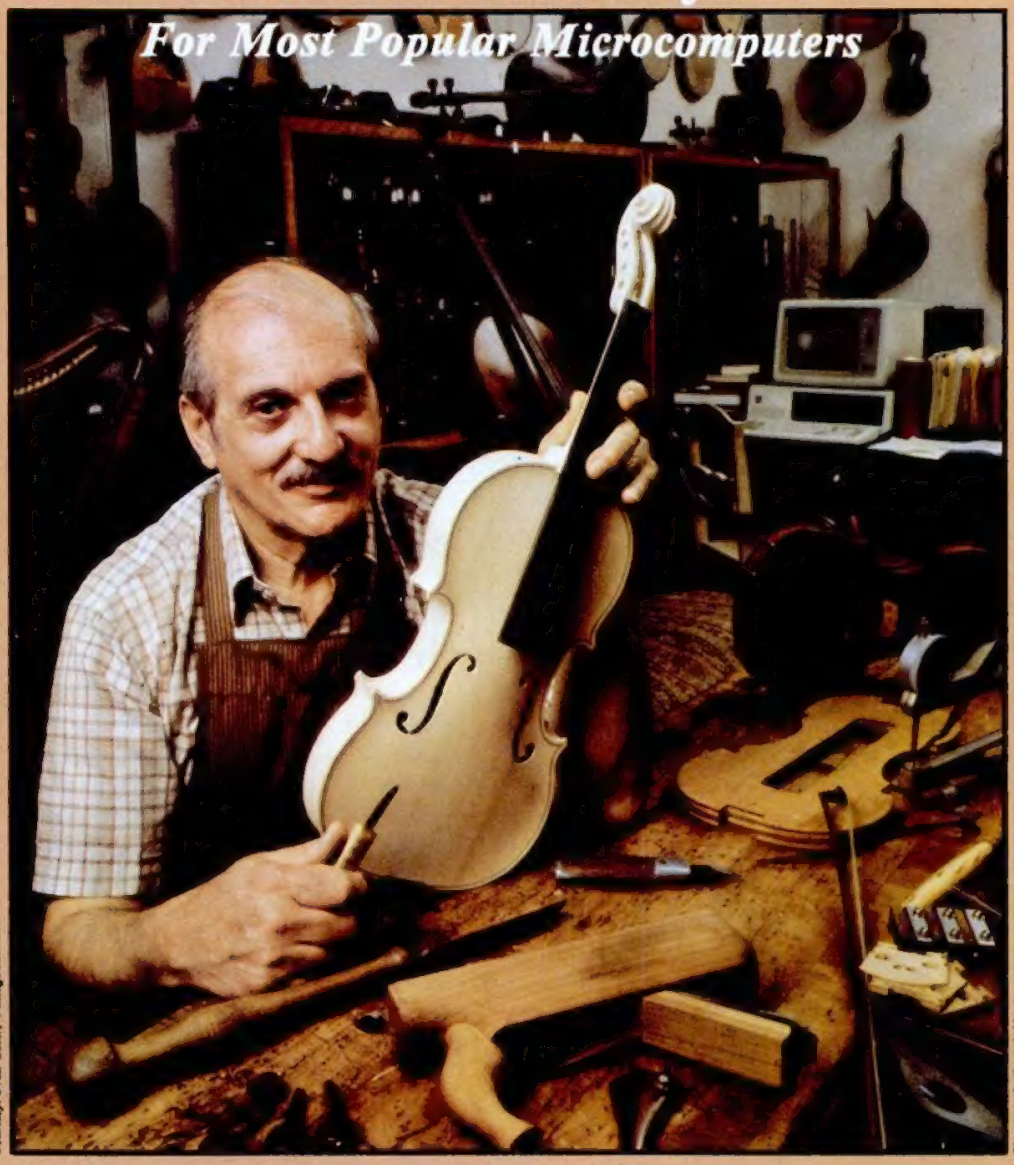
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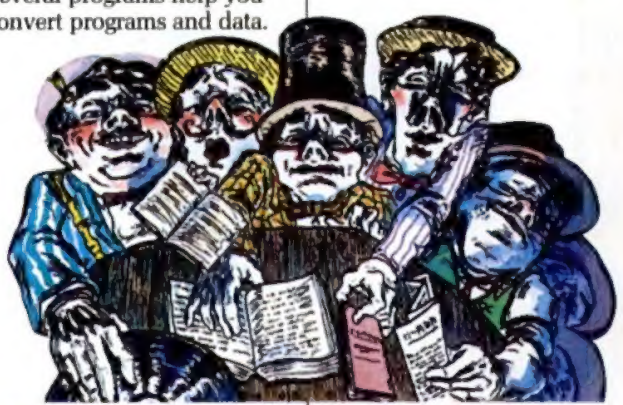
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COVER

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It took hundreds of years to build the world's most advanced spreadsheet.

Way back in 1534, a Venetian scholar wrote a text that standardized the techniques of modern bookkeeping. And up till 1979, there weren't a lot of real improvements in the way people did spreadsheets. You still had to enter all your figures by hand. Run all the totals yourself. And when you had to make a few changes, you had to run the totals all over again.

Then along came a program that let you create spreadsheets on a personal computer. Without touching a pencil. Or adding anything by hand. Best of all, this new program gave you the freedom to look at your balance sheet a dozen different ways if you felt like it. Because all you had to do was change one figure, and the computer would refigure everything else for you. Automatically.

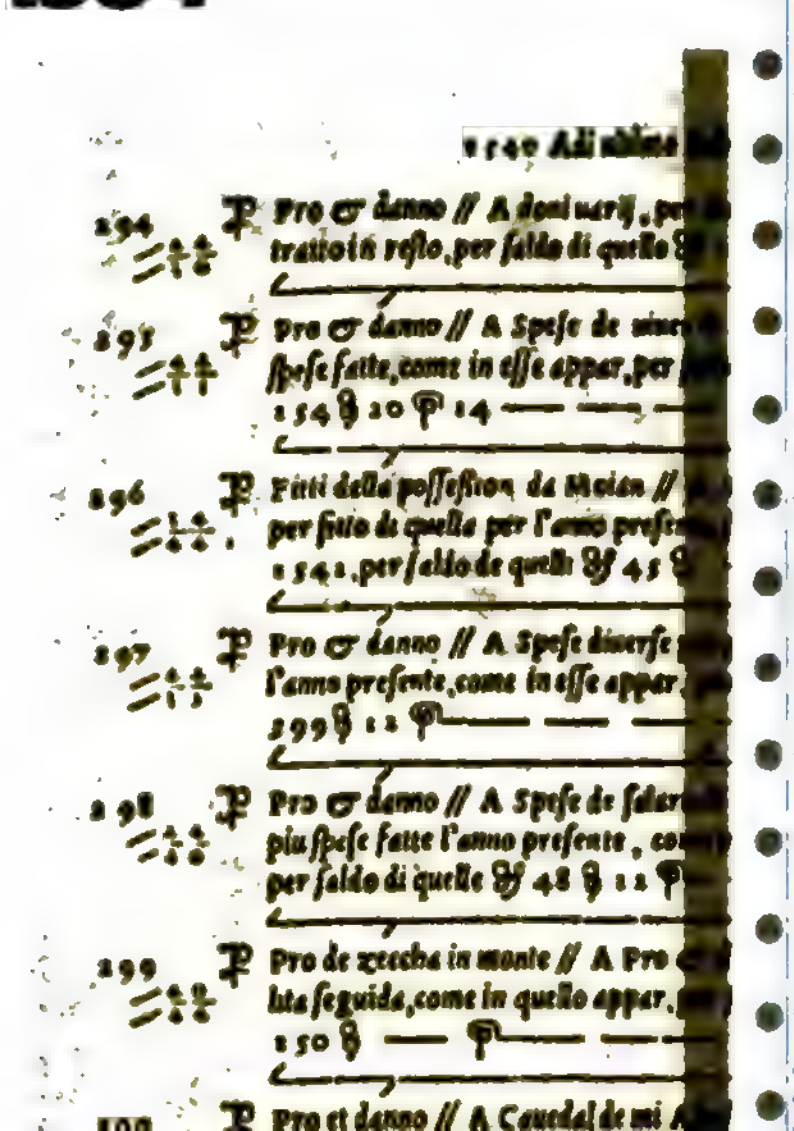
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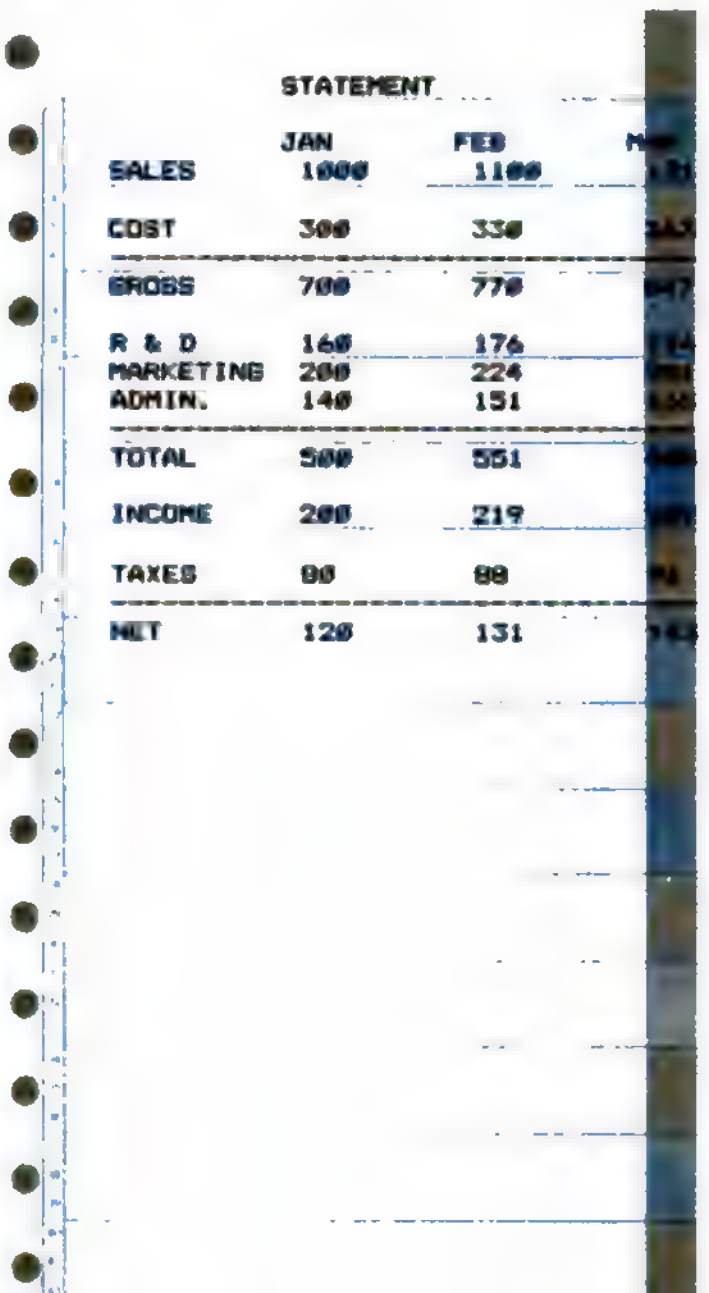
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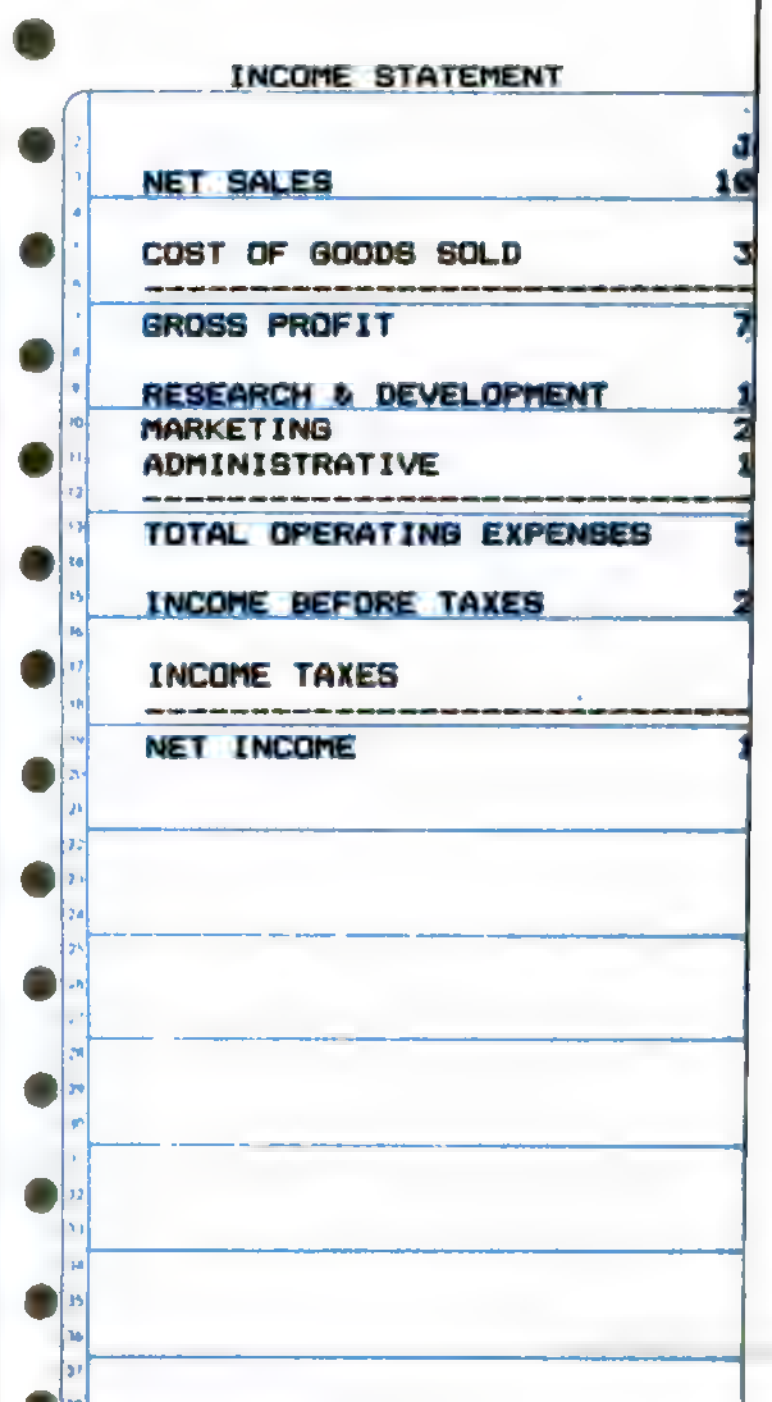
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1979



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But with all its advanced features, SuperCalc² is the same price as the original SuperCalc. Only $295, suggested retail. We're also offering SuperCalc for only $195. And an upgrade to SuperCalc² whenever you're ready.

So. If you've always thought there had to be a better way to do your spreadsheets, stop by your closest computer store. And take a good look at SuperCalc². After just 10 minutes, you won't want to do one more spreadsheet the old way.

1983

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 49    Beckette          S       $750.00   ( $56.25)   $693.75     $5,250.00
 84    Johnson           S       $850.00   ( $63.75)   $786.25     $5,950.00
 92    Jones             M       $900.00   ( $67.50)   $832.50     $6,300.00
 12    Samson            S       $560.00   ( $42.00)   $518.00     $3,920.00
 19    Santos            M       $650.00   ( $48.75)   $601.25     $4,550.00
 45    Smith             S       $700.00   ( $52.50)   $647.50     $4,900.00
=============================================================================
Total # employees        7

Total Gross Salaries (100's)      $55.1
Total Deductions (100's)          $-4.1
Total Net Pay (100's)             $51.0
```

User-set decimal places.

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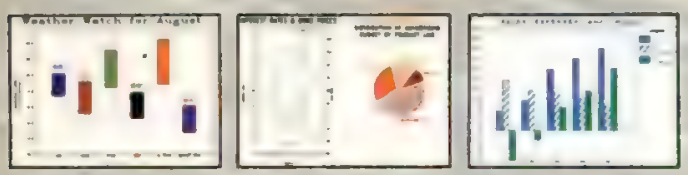
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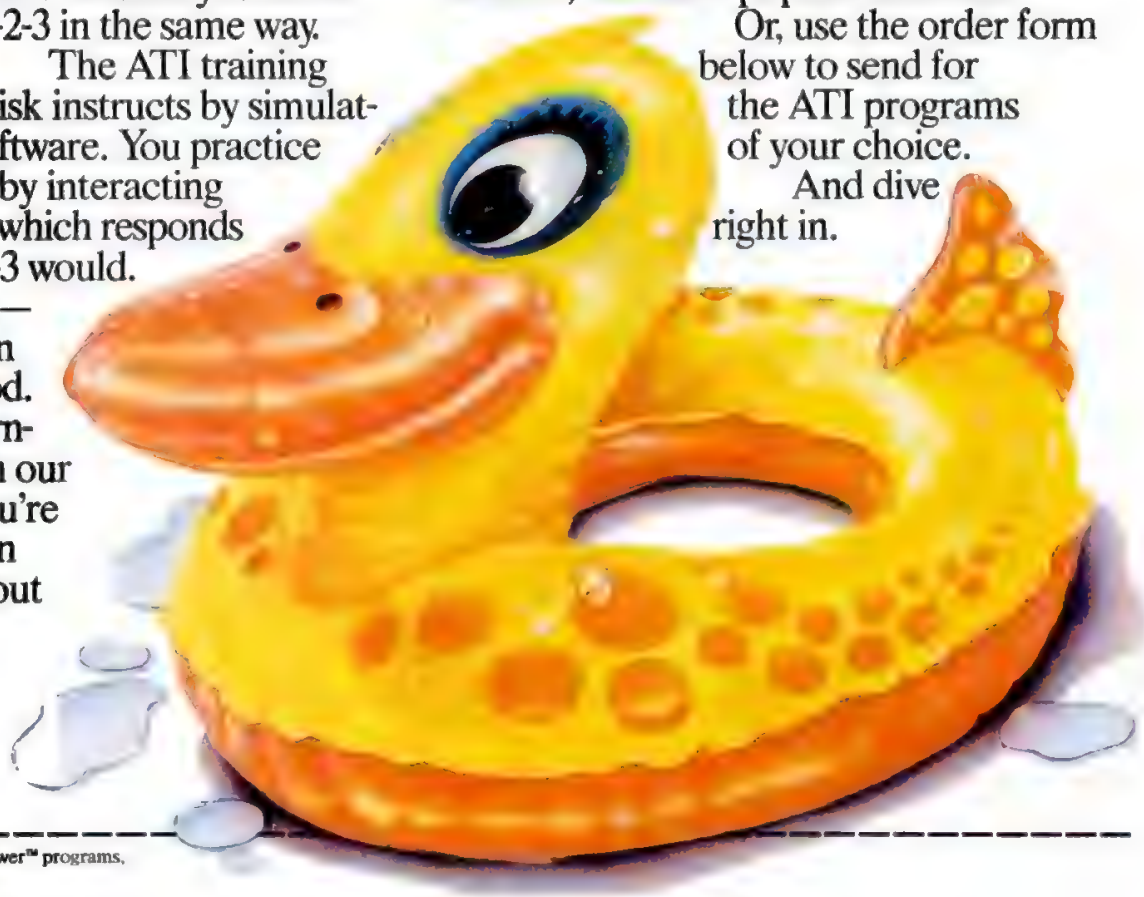
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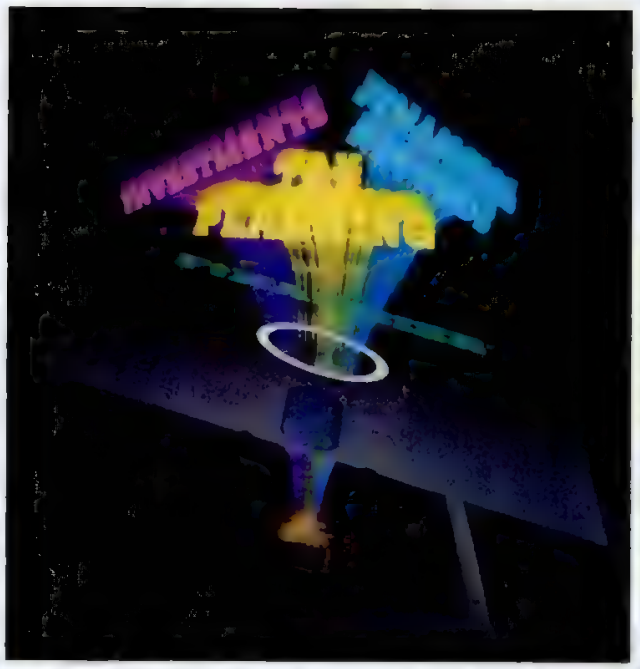
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Reviewer, SOFTALK
June, 1983

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Steven Yoder and
Sherry Knight, CPA
PC Magazine, February, 1983

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So if you're looking for computer programs that do more than just "babysit" for your kids, read on. You'll find that our Early Learning Programs are not only compatible with **Apple,® Atari,® IBM®** and **Commodore 64™** computers, but also with kids who like to have fun.



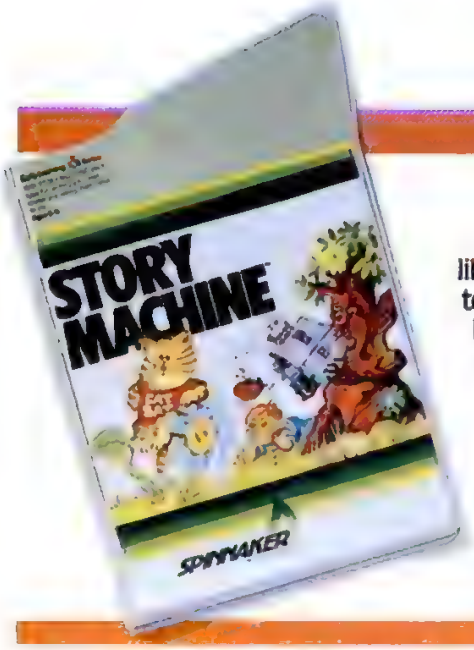
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The story of STORY MACHINE.™ Ages 5 to 9.



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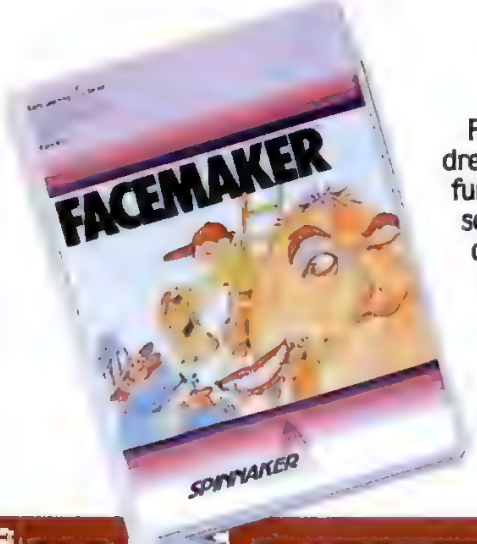
KINDERCOMP.™ Numbers, shapes, letters, words and drawings make fun. Ages 3 to 8.



KINDERCOMP is a game that allows very young children to start learning on the computer. It's a collection of learning exercises that ask your children to match shapes and letters, write their names, draw pictures, or fill in missing numbers. And KINDERCOMP will delight kids with colorful rewards, as the screen comes to life when correct answers are given.

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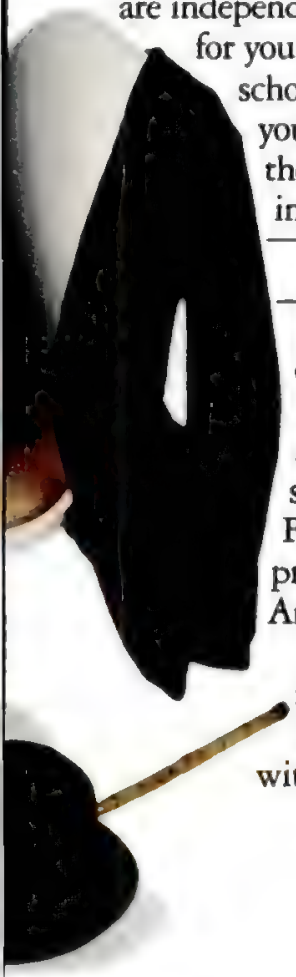
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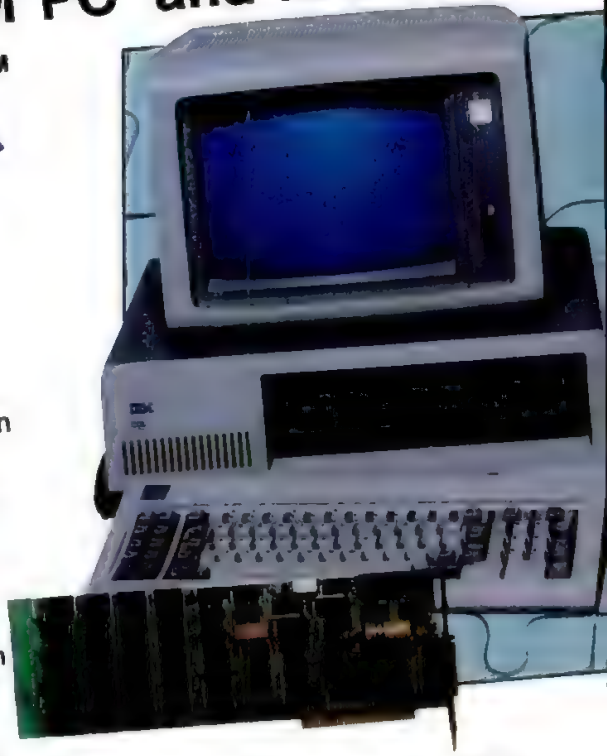


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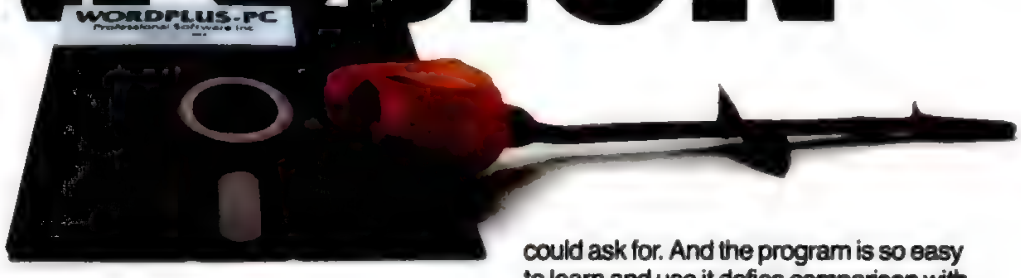
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It's one confusing business, choosing a word processor. All those companies assuring you theirs is the most fantastic one of all. And leaving you to cut through all the smoke and hopefully whittle them down to the best one for you.

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FIRST, A WARNING. There are two things you must do when evaluating any word processor. First, be careful. It's no secret that many of today's claims about being easy to learn and use just don't stand up to careful comparison. Watch carefully for complicated codes and programs that require "training sessions." Secondly, be selective. Buy a word processor you can use on a daily basis, not one that requires another "training session" when someone goes on vacation. In other words, be very careful to select the word processor that's absolutely the best and easiest to use. Which is what we'll now introduce you to.

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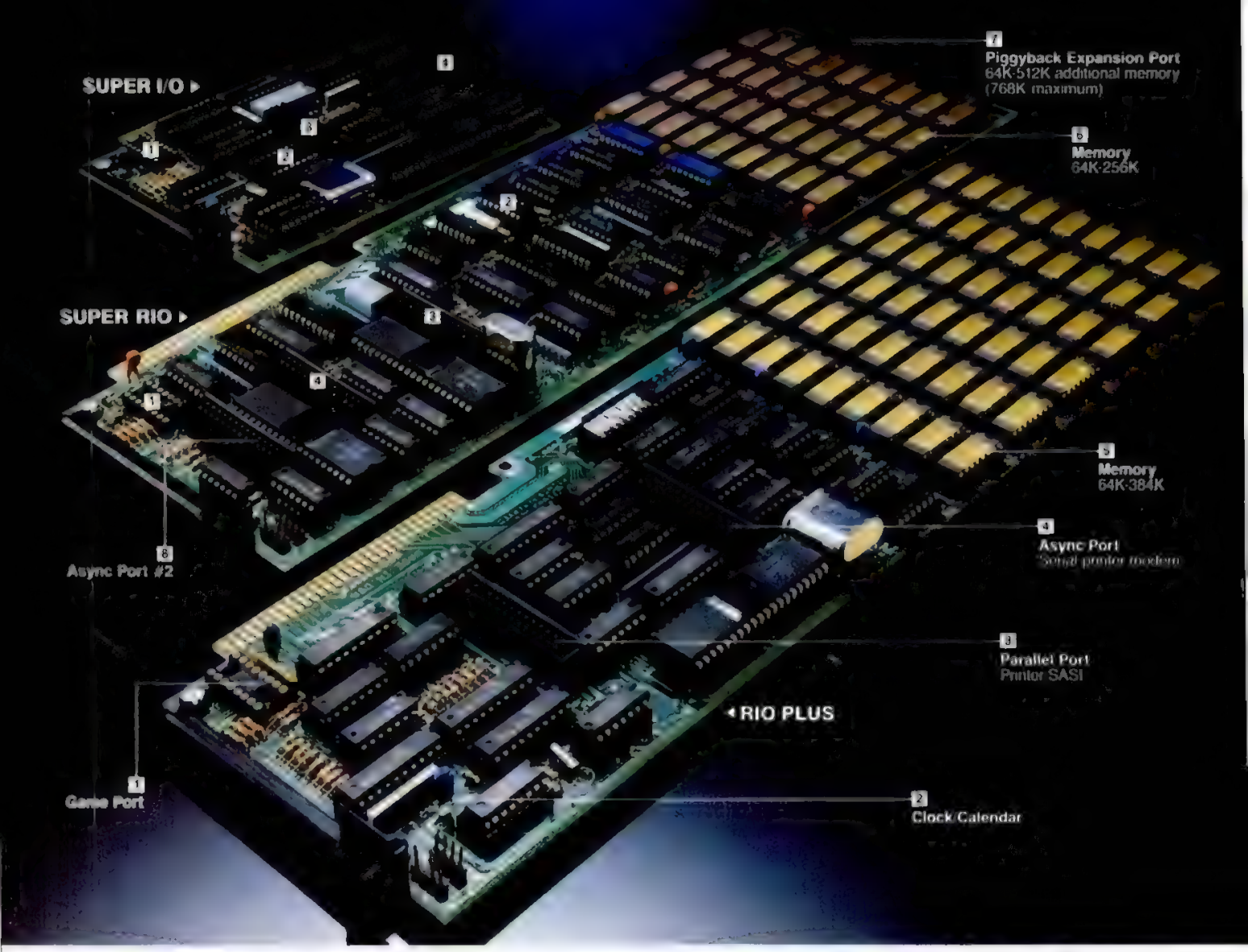
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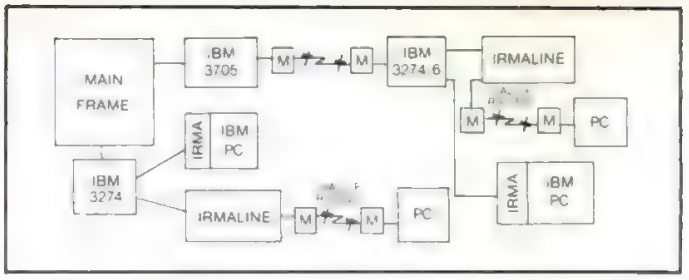
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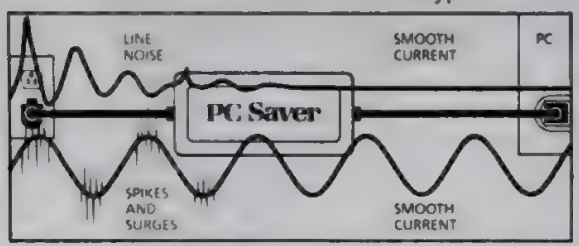
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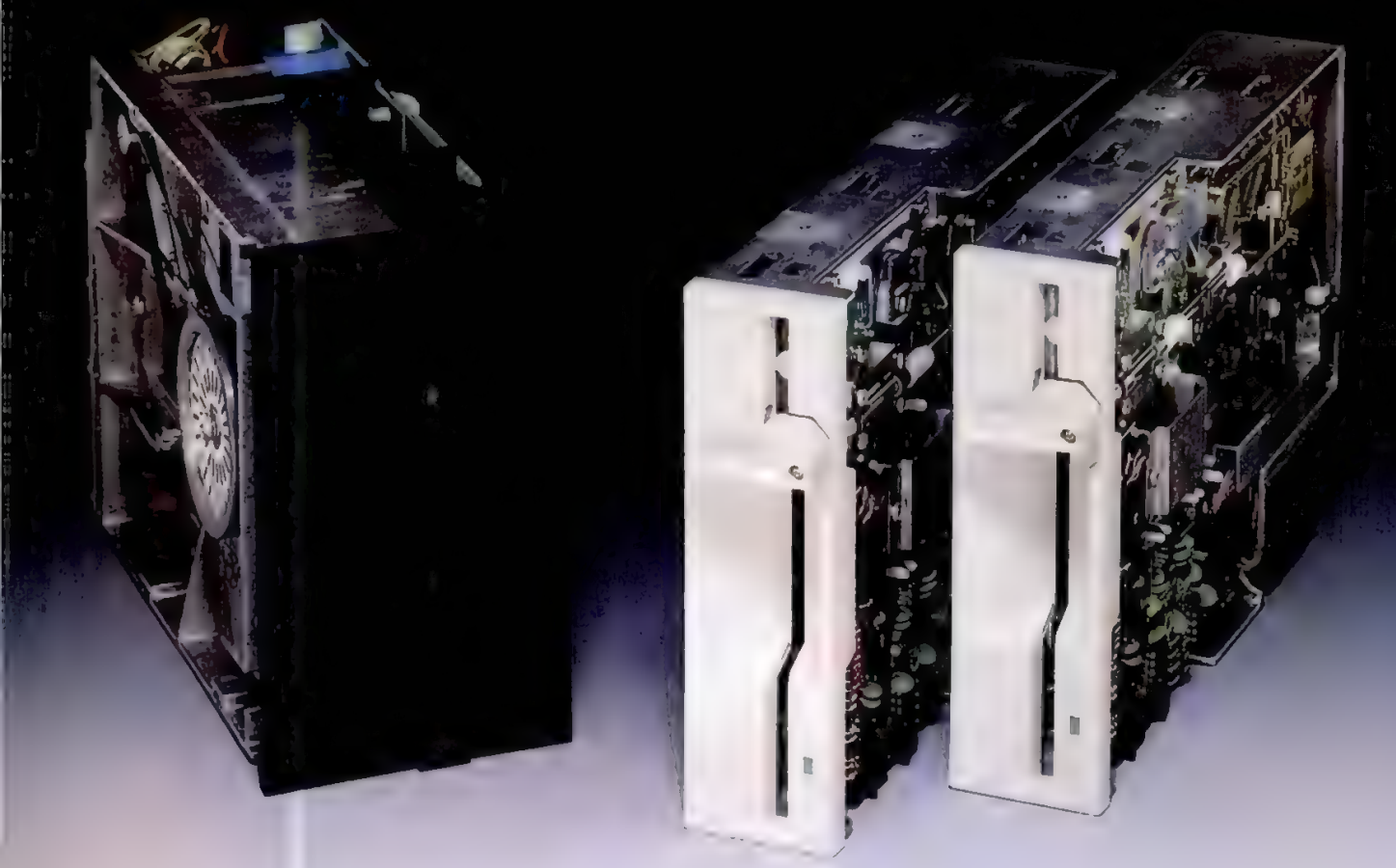
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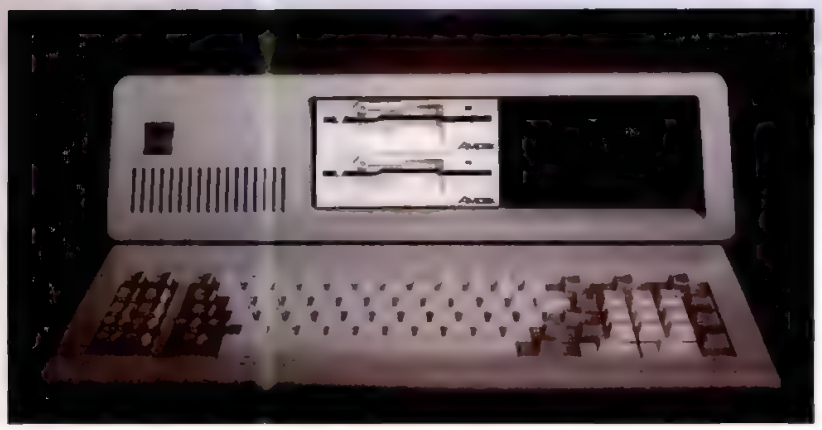
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FROM THE EDITOR'S SCREEN/COREY SANDLER

In its march to the front of the personal computer parade, IBM has cleared a trail for a herd of fortune seekers. Among the winners, count the makers of PC compatibles, Charlie Chaplin bowler hats—and guess who else?

Another PC Success Story

October was a horror story as we at *PC Magazine* paid homage to Halloween with tales of the poltergeists, goblins, and demons that are sometimes attracted like moths to the flame of an IBM PC. This month we take note of the fourth Thursday in November as we give thanks for things that work. And, we make an announcement to our readers. . . .

Now, of course, we all know that IBM is the biggest success story of them all, thank you, with its initial foray into the no-longer-little world of microcomputing. They ain't saying, and we can only estimate that there are already several hundred thousand cute beige, tan, and black IBM PCs out there, and the factories are on triple shift cranking out more. IBM has regained its preeminent position in the computer world, leaving every would-be challenger in corporate terror of Big Blue's next earthquake.

But why dwell on the obvious? Like the sparrows that follow the parading elephants at the circus, a whole industry made up of hangers-on and supporting characters has sprung up in IBM's wake. These consummate capitalists thrive on filling the gaps IBM deems too small to bother with.

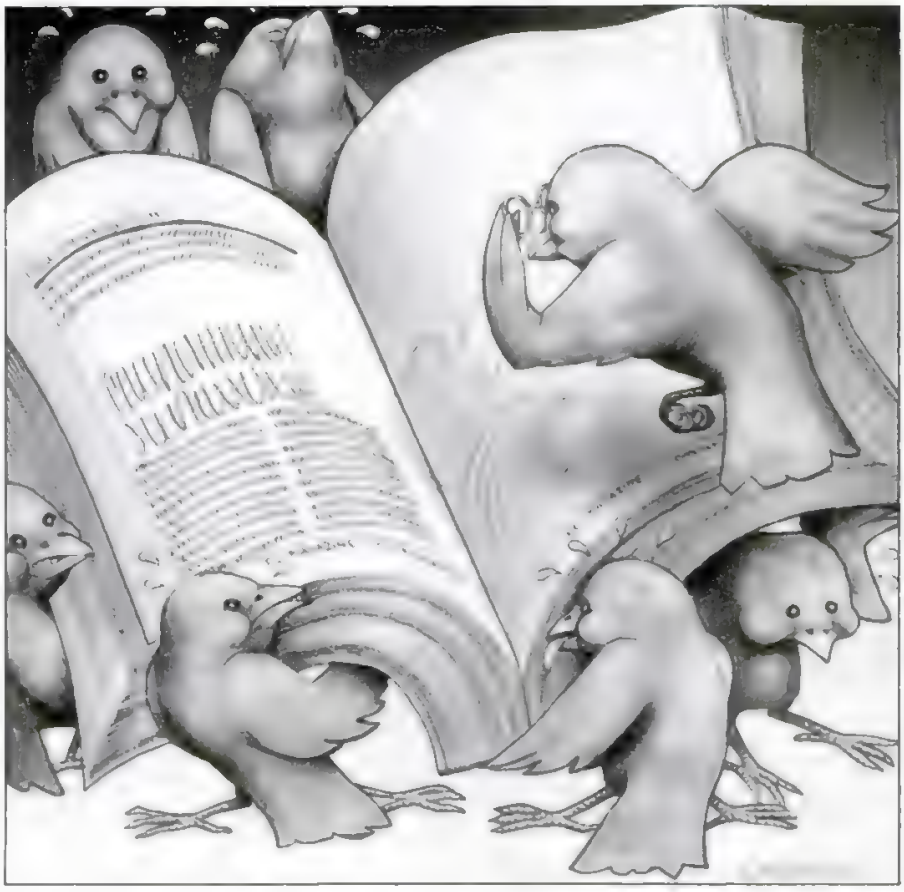


Illustration by Mike Okamoto

Let us consider, for example, the suppliers of those silver stickum patches included in every box of floppy disks, which serve as temporary write-protection for programs. I don't know about you, but I always manage to end up a sheet or two short after having used up my supply in a conservation-minded security binge, or, more likely, after having lost the stickers in the swamp of my desktop. (Remember desks?) I've even resorted to cannibalizing unopened boxes of floppies—don't need the disks yet, just the silver tabs. Somebody must be making a fortune on those stickers. Why didn't I think of that?

And how about the manufacturers of all of those disk envelopes? You know, the ones you always seem to have too many of when you don't need them, and too few when you do. Most of them are made of something called Tyvek, a modern synthetic equivalent of chain mail. I once got a letter in a Tyvek envelope sealed with an extra layer of fiberglass tape. I broke two letter openers and dulled my best Swiss Army knife before I finally rescued the junk inside and threw it out. Anyhow, Phineas T. Tyvek, or whoever you are, are you happy tonight?

PHINEAS T. Tyvek, or whoever you are, are you happy tonight?

Of course, you're sure to have noticed how linen-covered cardboard slipcases are suddenly in vogue. It all started with IBM's instruction manuals, but now almost everything—including a press release received here—is encased thusly. I thought those boxes had gone out with piano rolls and mustache wax. (Speaking of mustache wax, I'll bet the manufacturers of Charlie Chaplin bowler hats and canes are putting in extra hours these days.)

And, need I say, each of those slipcases includes a plastic disk holder. (The cheaper programs have given new life to the ziplock bag vendors.)

Now, I'm not sure if you are aware that New York City doesn't give ticker-tape parades anymore. You see, there no longer is any such thing as ticker tape, now that stock quotes are all bits and bytes in an electronic datastream. But somewhere, I imagine, somebody has cornered the market on all the punched-out sprocket holes from tractor-feed printing paper. I can see a growing mountain of white dots—perhaps they'll put in a chairlift and start America's first all-year ski resort, Mount Charlie.

And despite the best efforts of dozens of modem manufacturers and communications software writers, no one has completely succeeded yet in supplanting the warm, secure feeling of opening a Federal Express envelope in the morning. Someday, when a disk full of

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• 1983

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information absolutely, positively has to get there overnight, we'll all dial each other up and let our PCs do the talking. Until then, send for the Pony Express. (By the way, those envelopes are made of old friend Tyvek.)

And there's one other group of essential peripherals for most microcomputer owners I know. Why in the world didn't I buy stock in the parent companies of Bayer Aspirin, Alka Seltzer, and Tums?

But, alas, all is not roses in the shadow of C. Chaplin's favorite machine. As that great American sportsman George Steinbrenner might say, "In order to have winners, you've got to have losers."

To begin with, think of your poor overburdened mailman on the day *PC Magazine* is delivered. In particular, think of the guys with postal routes in Silicon Valley or Boca Raton. They've got a load on their shoulders.

And how'd you like to be the Amalgamated Paper Spreadsheet Company? I'd imagine their books are showing a fair amount of red ink these days; that is, if the books are not already converted to an electronic calcsheet, in which case they're bleeding red phosphor instead.

Don't overlook green eyeshades, pink pencil erasers, and celluloid cuff protectors, either. We've got them on the list, too. Will none of them be missed?

WHY IN THE world didn't I buy stock in the parent companies of Bayer Aspirin, Alka Seltzer, and Tums?

But, oh, I almost forgot one other big winner in the Great IBM PC Explosion. You and me, folks.

Micro-Corporeal Success

Another beneficiary of success—how permanent remains to be seen—is the throng of PC-compatible manufacturers who are competing for market share on the basis of price or features.

I had lunch recently with the president of one of these companies—a very knowledgeable and candid man, very sure of himself and of his company. On the promise of anonymity, we began a discussion about the economics of production.

The average price of the company's line—as it goes out the door of the factory and before any markups—is about $2,000. I asked the president, "Right now, if you were able to take advantage of every available cost-saving mechanism, including VLSI chips and automated assembly and testing, and could obtain resources at the optimum economy of scale, could you make a profit on these same machines at $1,000?" His answer was an unequivocal "yes." In fact, he went further and said that technology and methods already in the pipeline should make it possible to earn a profit at a wholesale price much less than $1,000 for the same *or even a*

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- FABS directs all Access, Insert, and Delete file operations
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- Multiple primary key and multi-level key plus duplicate and variable-length keys are supported
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- Deleted records are automatically reclaimed by subsequent insert operations
- Key files never need to be re-sorted: excellent error handling
- Generic search returns the first occurrence of partial key; search-next provides sequential read
- Loads resident with DOS, occupying less than 15k bytes
- Easy to incorporate into existing file-intensive applications
- Extensive commands: Create, Open, Close key file, Search (first, last, next, previous, generic), Insert, Delete, Replace key, Max Length, Open Deletes, # of Records, # of Keys

A U T O S O R T

high speed Sort/Merge/Select sub-system

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- Versions available for CP/M-80, MP/M-II, CP/M-86 and MS-DOS, PC-DOS running Microsoft BASIC(s), FORTRAN, PASCAL, CBASIC, CB80, CBASIC86, CB86.
- Record size may exceed 5000 bytes, and file length is unlimited
- Sorts based on up to 10 fixed or variable length keys, each ascending/descending
- Key fields may be string, integer, single or double precision numeric
- Output files may consist of full records, key with record pointer, and record pointer only
- Select for retain/delete based on up to 4 keys, AND, OR, > < , =, conditions
- Single or multi-user; sorted files may be merged
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- Boot straps itself into and out of memory claiming/restoring memory automatically
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- Interactive parameter set-up program is supplied; files may be on disk drives A-Z

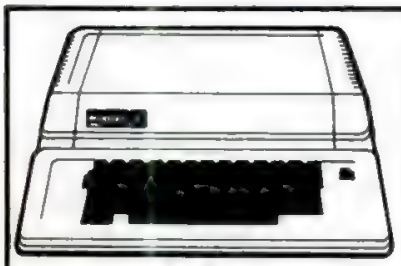
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Saturn Systems 32K RAM Card for I	$ 249	$169
64K RAM Card for I	$ 425	$299
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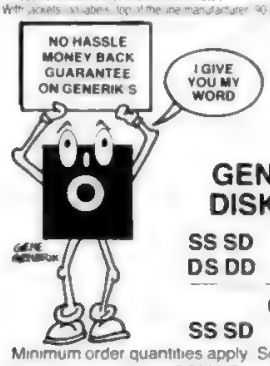
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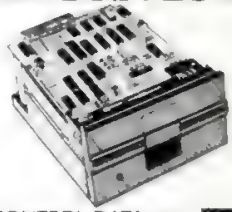
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IBM PC Smartcom II Software	$ 119	$ 89
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Micromodem II for Apple II	$ 379	$ 275
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more capable machine.

What, then, does this mean in terms of the much-awaited burgeoning of the home market for microcomputers? Well, he said, it should be obvious that this company, or a similar not-small-but-not-huge firm *could* compete with IBM in the low end of the market on the basis of price, even with an American-made product and even more so if the manufacture was moved offshore. But, at the same time, it should be obvious that this company, or a similar one, *cannot* hope to compete with a low-priced home machine if that product has IBM's name on it and IBM's promotion budget behind it. "A $10-million ad campaign is just lunch money for them," he said. Therefore, the president added, his company *will not* compete in the home market and will instead concentrate on the high-end market.

But all is not simple there, either. The traditional strategy for IBM's hangers-on in the past (the "plug-compatible" manufacturers in the mainframe market) has been to surround IBM's product line in terms of price and capabilities. That's not going to happen if the compatible makers truncate their arc at IBM's business machines, presumably the PC, PC-XT, and other improvements to come.

And think about this: If this comparatively tiny IBM-compatible manufacturer's $2,000 selling price includes the potential for more than $1,000 in profit for a PC-like machine, think what big IBM's profit margin could be. Or, think how low IBM could drop its price to maintain its market share if it chose to.

And then think about how close in price an IBM PC or a compatible PC priced at $1,000 *retail* would be to the home machines in the $600 to $1,000 range.

Lest you think that all of this talk of monumental price restructuring is a bit premature, take the opportunity to mosey on down to your neighborhood computer store and peek beneath the hood of the "new" Apple IIe—the latest upgrade and rework of the original Apple II. There is nothing inside! Well, almost nothing. The whole shebang, with its single board and custom chips (not to mention its already-established market recognition and amortized design and plant), can't be costing Apple more than a few hundred dollars in total.

And Now, the Envelope . . .

We promised an announcement at the top of this column, but we wanted you to read a bit about the marketplace first. Now then, in case you somehow didn't realize it when you wheeled your copy of *PC Magazine* into your office or your living room today, you're holding another success born of the IBM PC. This magazine and our sister publications *PC Technical Journal* and *PC Disk Magazine*, together with a few other publications we understand are also on the market, are the most visible reflection of the length of IBM's tuxedo tails.

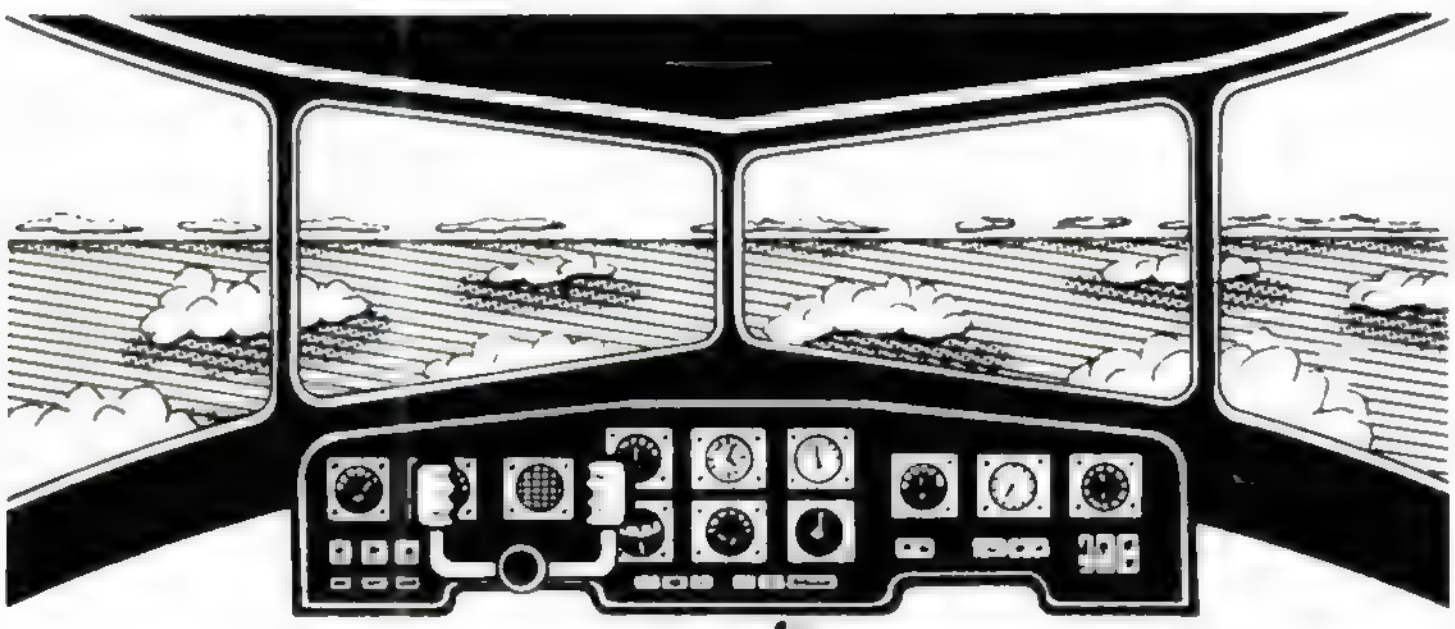
PC Magazine has been getting bigger (and, we hope, better) with every issue. But the size is still a problem—to our writers, to our editors, to our typesetters, to our art department, to our printers, to the Postal Service, and most importantly, to our readers.

And there is another problem: So much is happening in the world of IBM PCs—hardware, software, and compatibles—that at times, a month seems like an eternity. The fact is that as you read these words in November, we should be putting the finishing touches on our February issue. But these are not ordinary times.

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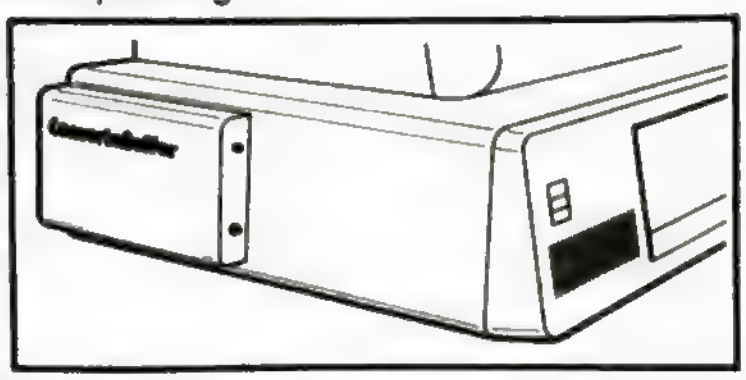
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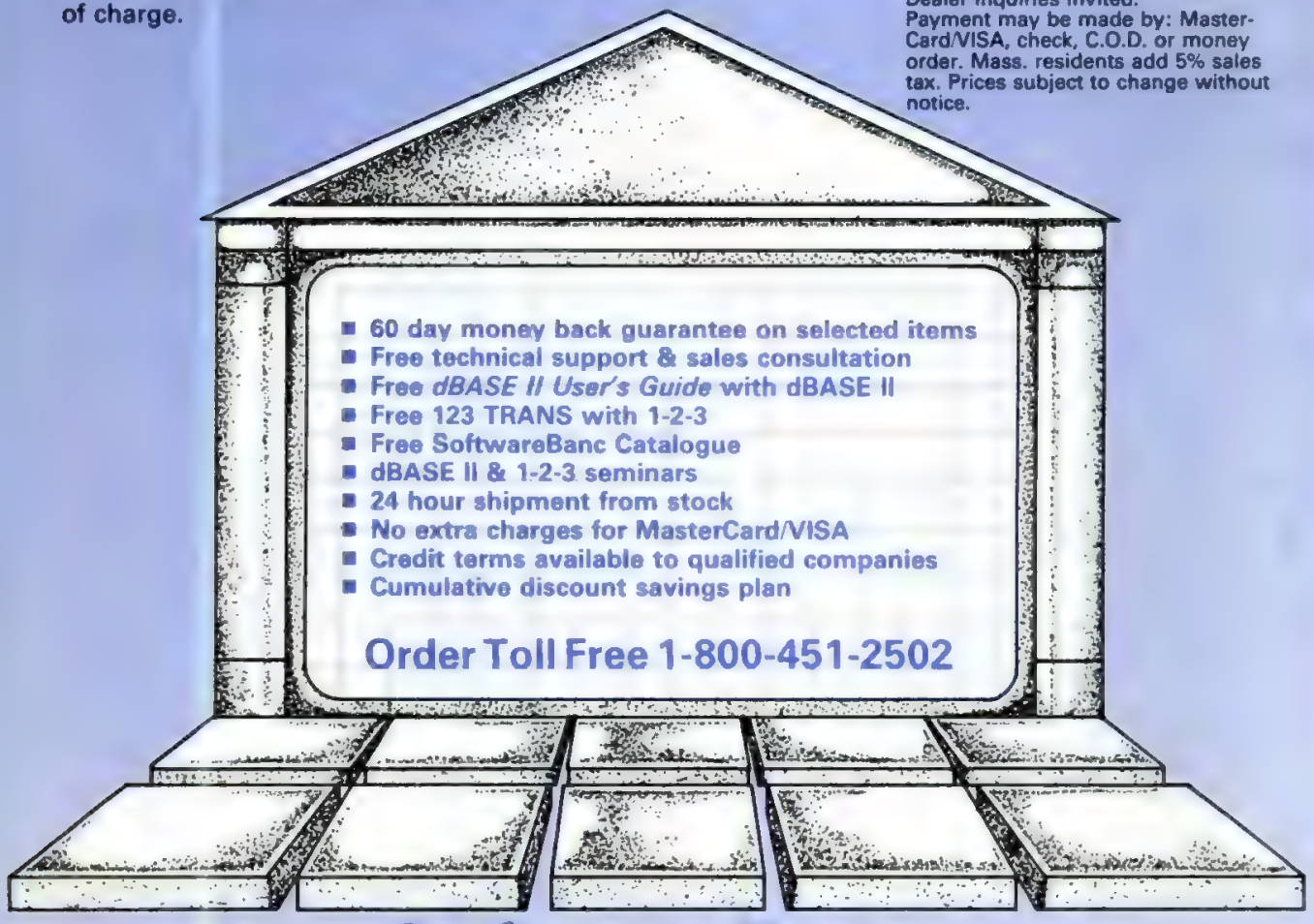
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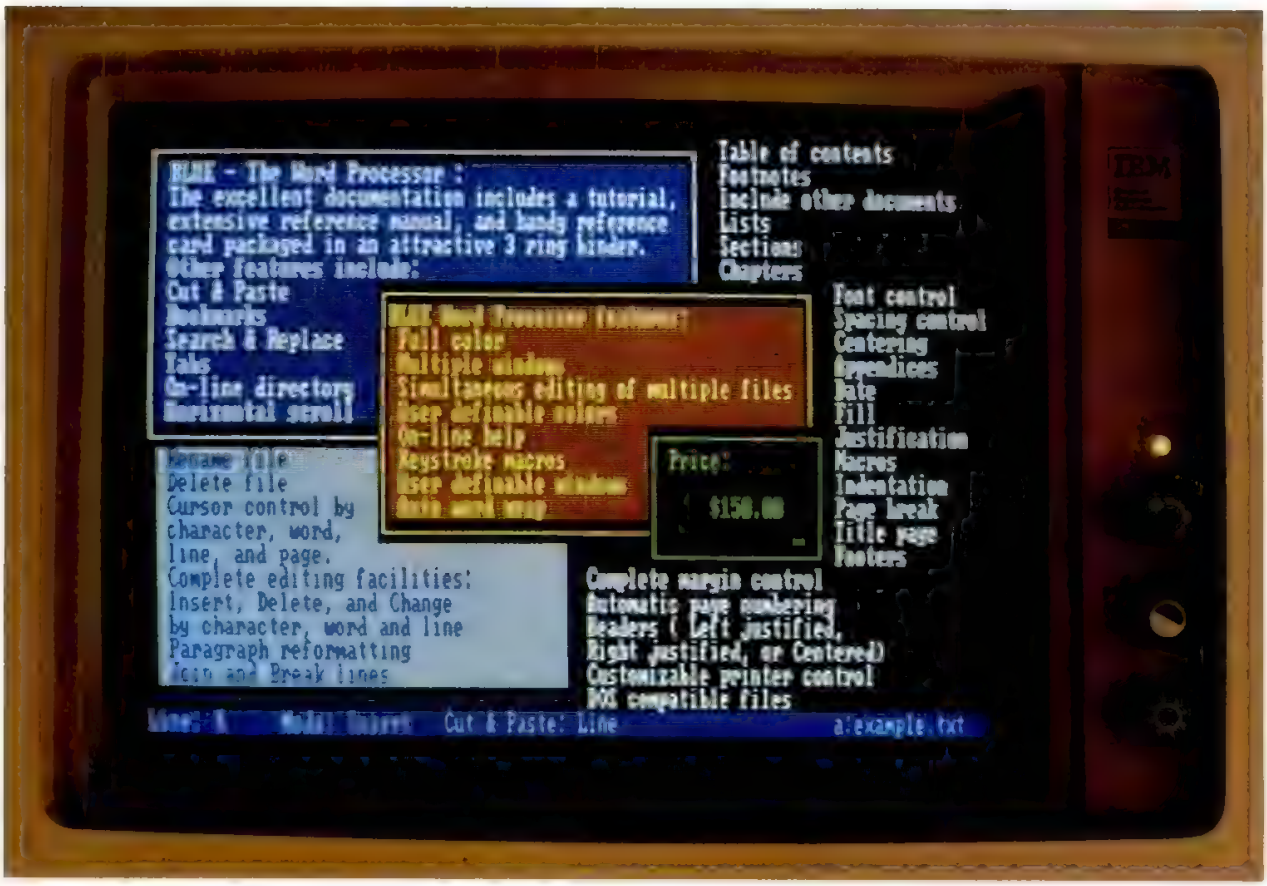
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It's the Executive Picture Show and it's long on capabilities where other programs fall short.

With Executive Picture Show you can create:

- free-form graphics
- business graphics
- slide show presentations
- animated presentations

Presentations to keep viewers on the edge of their seats.

Not only does Executive Picture Show accept screens from other programs, it lets you integrate them into your presentation where and when you want them. Then you can add the sound, motion, and color that insures a captive audience. Dropping in your company logo or making bar graphs take form right before your viewer's eyes is easy as pressing a few keys.

Executive Picture Show allows you to use both your IBM® monochrome and color monitors during your presentation. This means you can show a spreadsheet on your monochrome monitor, while a graph or drawing is formed on your color display.

Interactive presentations.

The Executive Picture Show was designed with you and the audience in mind. Not only does it allow you to design a moving presentation, it gives your viewers a chance to respond with more than enthusiastic reviews. They can actually input their responses so the program — and you — can act on their input.

Easy to use.

We had the business executive in mind when we designed this tool. That's why Executive Picture Show cuts through all the "computer-ese" to simplify instruction and prompts you throughout the program. We've reduced many steps to single key commands and included a handy reference card to help you get your show on the road.

Executive Picture Show is playing at a computer store near you for just $195. If you want to preview this program, contact PCsoftware of San Diego directly for a demonstration disk and documentation priced at $30.

Requires: Graphics adapter and display
128K RAM
2 disk drives or hard disk
IBM PC or IBM XT

Lotus 1-2-3, CREATABASE, and WordStar are trademarks of Lotus, PCsoftware of San Diego, and Micropro International Corp., respectively. dBASE II and IBM are registered trademarks of Ashton-Tate and International Business Machines, Inc.

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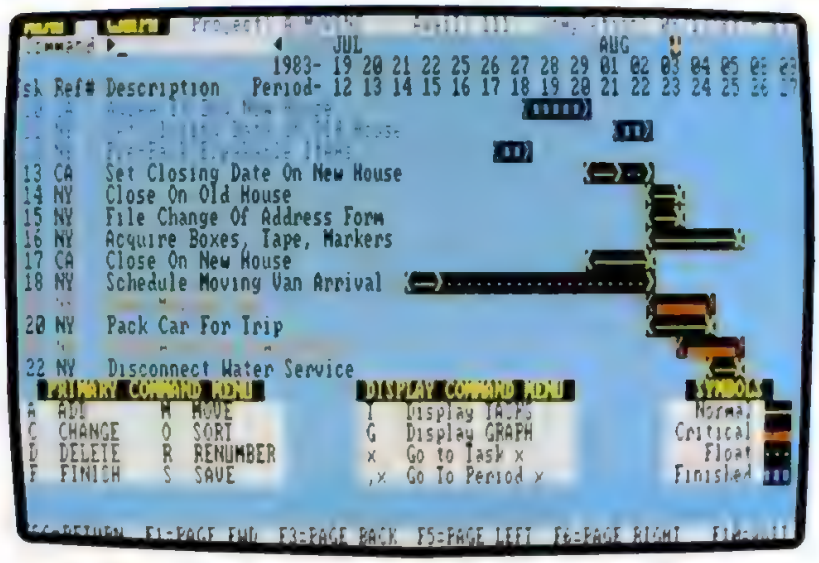
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- Immediate "what if" analysis
- Full color or monochrome display
- Float time automatically calculated
- Projected completion date displayed after each change
- Bar chart or task details can be displayed
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- Progress can be reported with task completions
- Multiple resource types supported
- Critical Tasks highlighted
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- Sophisticated reporting system lets you design your own reports
- All reports can be previewed on the screen
- Cost and resource summaries can be printed

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PRO-JECT 6

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- IS THE PROJECT SCHEDULE REALISTIC?
- HOW CAN THE PROJECT BE SHORTENED?
- IS THE PROJECT ON SCHEDULE?
- HOW CAN RESOURCES BEST BE MANAGED?
- WHAT WILL THE PROJECT COST?
- WHAT TASKS REQUIRE CLOSE SUPERVISION?

CIRCLE 457 ON READER SERVICE CARD

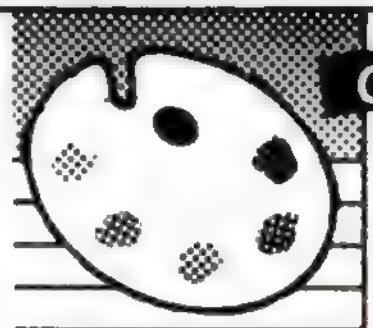
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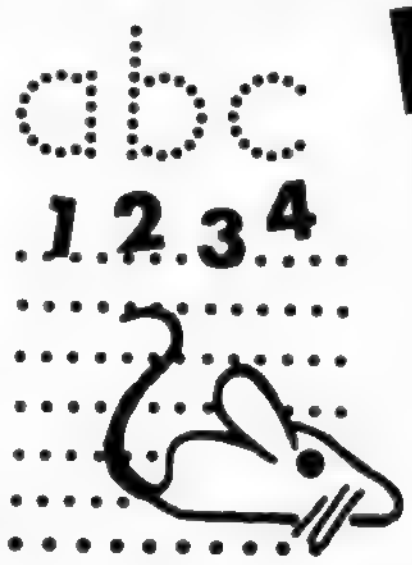


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by Stone & Associates Inc

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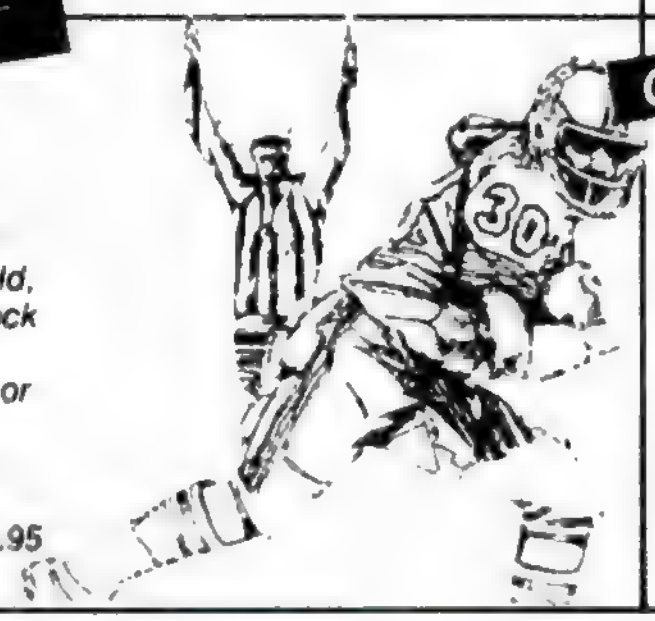
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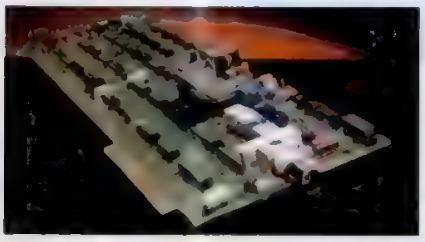


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Easy-to-use: CREATABASE lets you organize business and personal information with just two simple steps to efficient record keeping. First, define a file by telling CREATABASE about the information kept in the file, and how it should appear on the screen. Second, type in your data as if you were filling out a form. Your data is now at your fingertips, to search, update, sort, and print.

CREATABASE is completely menu driven. Function key meanings are displayed throughout, so there's no need to remember command names or key assignments. Help screens are available at the push of a button.

CREATABASE fits on one disk to eliminate time consuming and confusing disk-swapping.

The CREATABASE manual contains a step-by-step tutorial to demonstrate all features.

Powerful: CREATABASE lets you add, delete, update information and reorganize your files with just the press of a button.

Screen designs and report layouts are completely under your control. Design your data input screen to look like a form you already use.

Our flexible report formatter lets you design reports, form letters, mailing labels, lists, invoices, etc.

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Inexpensive: At $75, CREATABASE is the best value in information management software on the market today. Compare our features to our competitors, T.I.M.III™, VisiFile™, and pfs: file & report™, and see for yourself.

General Features:
- Flexible screen design
- Flexible report design
- Full-field editing
- Key field for extremely fast access
- Fast and flexible assembler language sort routine.
- Process records in keyed, sorted, or entry order
- You can change key field at any time
- Add or delete fields without data re-entry
- Totally flexible search criteria on any or all fields
- Supports all printers and 80 column displays

File Features:
- Multiple files on one diskette
- Up to 1200 (64K) or 2200 records (128K) per file
- Entire file must reside on one diskette
- Maximum of 16 fields per record
- Possible field types and lengths are:
  - a — Alphanumeric (62)
  - A — Alphanumeric, All Capitals (62)
  - N — Numeric (14, with up to 13 decimal places)
  - D — Date (8, format is MM-DD-YY)

PCsoftware provides service and support for all its products.

	CREATABASE	dBASE II	pfs: file & pfs: report	VisiFile	T.I.M. III
Menu Driven	✓ (yes)	no	✓	✓	✓
Help Screens	✓	no	no	✓	✓
User-Designed Input Screens	✓	PN*	✓	✓	✓
User-Designed Lists, Form Letters Labels, Pre-Printed Forms	✓	PN*	no	no	no
Random Record Access by Key	✓	PN*	✓	no	✓
Sort Data	✓	✓	Output Only	✓	✓
Calculated Fields & Totals	no	✓	Output Only	✓	✓
Records per file	1200 (64K)‡ 2200 (128K)	65535‡	1100 (SS Disk)‡ 2200 (DS Disk)	32767‡	32767‡
Fields per Record	16	32	Variable	40 (64K) 128 (128K)	40
Types of Fields	4	3	1	5	8
Character/Field Characters/Record	62 992	254 1000	1660 2000+	254 2048	80 2400
Especially Designed for IBM PC	✓	no	no	no	no
Retail Price	$75	$700	$265	$300	$495

*PN Programming needed to provide this capability.
‡ In practice, disk capacity limits file size (e.g., a single sided disk with 200 characters/record will become full at about 700 records).



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Letters To PC

Free Wares

PC's software reviews are invaluable sources of information. Your reviewers have recognized that often the best program for a job is not the most expensive. In fact, some of the best programs, like *PC-Talk* and *PC-File*, are free.

I have been offering a small statistical package to PC users free of charge. The program, called *Epistat*, is written in BASICA and can assist in the analysis of small- to medium-sized samples (fewer than 1000 observations per sample). It provides for data entry, editing, sorting, printing, graphing histograms, and saving data to disk files.

It also performs 34 common statistical tests or functions, including analysis of variance, binomial distribution, Chi-square test, correlation distribution, Poisson distribution, rank sum and signed rank tests, rate adjustments, sample size calculations, standard deviation, and Student's T-test.

Epistat requires at least 64K, a color/graphics adapter, a monochrome or hi-res color monitor, and two 160K disk drives. I will be happy to distribute this program to readers who provide a 160K disk and a self-addressed, stamped mailer (or send $20 and I will supply disk and mailer). Please specify color or monochrome version. My address is 1705 Gattis School Road, Round Rock, TX 78664.

Terry L. Gustafson
Round Rock, Texas

Foreign Connections

It was great to see Corey Sandler's article on David Hall's company, PC Connection ("Down By The Old Mill Stream," *PC*, Volume 2 Number 2). I have had the pleasure of doing business with Dave from two different countries, first Canada and now the Netherlands.

Folks like me who live abroad don't have much protection from mail order houses, and we often must rely upon a friend's experience or just plain luck when ordering from an unknown.



Dealing with PC Connection has set a new high standard as far as I'm concerned. Dave has called back long distance to let us know if items were to be short-shipped or delayed, and customs documentation has always been perfect. If any of your foreign readers want a mail order house they can trust, I highly recommend Dave Hall's operation.

N.C. Helmkay
Uithoorn, Netherlands

A Note from Norman

I hope that your readers got all the way to the end of Stephen Manes's interview with me ("Marsha Norman: A Broadway Playwright Collaborates With The IBM PC," *PC*, Volume 2 Number 3) and read that Datel Systems did, in fact, come through. I now have the tractor feed that I griped so angrily about, and my card bracket was repaired the day after they received my letter. They are, it turns out, good people.

Let me add another bit of testimony, while I have you. This summer, I packed my PC, drove it to Lenox (Massachusetts) on a blazing hot day, and unpacked it for a summer's work in the woods. I was prepared for loose screws or blown circuits in both the PC and me, but it was a total success. No damage to either of us, and a new play to boot.

Marsha Norman
New York, New York

A Note on Norman

As an author who uses his PC only for word processing, I saw no need to subscribe to your magazine. Then I read the fine interview with Marsha Norman. My check is in the mail!

William Novak
Newton Centre, Massachusetts

The Right Mix

I was pleased to see John Woram's article, "The PC Sounds Off" (*PC*, Volume 2 Number 3), about the use of the PC in our Diskmix product and within our company. I hope that it will inspire other creative uses for the PC.

I would like to stress that my partner and co-founder in Sound Workshop is Paul Galburt. Paul has been chief engineer in charge of design and manufacturing since the company was formed, and he is equally responsible for the growth and success we have shared.

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Leading the new generation in word processing...

Textra leaves behind the costly and complicated word processors of yesterday.

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Most of today's word processors were converted to work on the IBM PC from their designs for yesterday's machines. If this seems like a step backwards, it is.

Textra was designed to take advantage of the speed and power in your IBM PC and the result is clear—a word processor that helps you work faster with less effort.

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Learning to use Textra is easy too!

Our highly acclaimed tutorial is actually a film on disk, rolling by on your screen. You can pause, change speeds, even fast forward or rewind, (and for the first time, have fun while learning to use a software program).

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Take a closer look.

See for yourself how easy Textra makes word processing. Ask your dealer for a demonstration today, or order directly from us. Send $95 with the confidence of a money back guarantee, or $3 for a full Test Disk. (Visa/MC, COD accepted)

Textra also works with the PC XT and leading compatibles.
Textra requires PC DOS (any version), 128 K, and a monochrome or color monitor.

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TM = Manufacturers trademark

Letters To PC

Although Sid Zimet was one of our original partners, he has not been associated with Sound Workshop for the past 5 years.

Since the article was written, we have eliminated all manual drafting. Our PCs now do 100 percent of our drafting chores in the engineering and marketing departments.

Michael Tapes
President, Sound Workshop Professional Audio Products, Inc.
Hauppauge, New York

Starwriter is Word Perfect

In response to Lindsy Van Gelder's review of *WordPerfect* ("WordPerfect Reaches For The Star," PC, Volume 1 Number 11), we would like to clarify the fact that the Starwriter printer does indeed work with *WordPerfect*.

Special features (boldface, underlining, superscript, etc.) can be done on the Starwriter with *WordPerfect* if the user chooses the Qume 5 or 9 option from the print selection menu.

Brenda Atchison
Leading Edge Products
Needham, Massachusetts

RPG II Found

I was pleased to read Rick Manning's letter, "RPG II, Where Are You?" ("Letters to PC," PC, Volume 2 Number 3), because I, like Rick, have been programming in RPG II for over 13 years on several IBM/GSD systems. I feel that procedural languages like COBOL, Pascal, and BASIC are simply too time-consuming to write and offer no significant advantages to the development of a system.

For this reason, I was not very interested in micros until a recent news release led me to California Products of Santa Ana, California and its product, Baby/34. This package allows programs written for the S/34 to be transferred to the PC and run with no modifications. Facilities are also available to do complete system development on the PC and pass the completed software back to the S/34.

At $2,500, the price isn't low as far as PC software goes, but considering the product's scope, I think it is worth the money.

Russell L. King
Medford, Oregon

We'd like to thank all the readers who wrote in to bring this product to our attention. There are lots of RPG II fans out there!—Ed.

Self-Taught

We were very pleased with the review of Cdex products in the August issue ("User, Teach Thyself," PC, Volume 2 Number 3). Although it was generally accurate, a few items were either overlooked or misconstrued by Winn Rosch, the author.

The article states that we show how to use the training program on the disk but don't explain how to load the disk in the first place. As a standard practice, we included step-by-step instructions for using our training products in the reference guide supplied with every package.

Rosch mentions that the program does not run on the PC-XT. In fact, the program he reviewed was not designed for use on the XT. We have a new product that covers the XT, including DOS 2.0 and the fixed disk.

Rosch also states that the program "doesn't tell you what you did wrong." This may be true in a few instances, but for the most part, the user is told why his or her response is right or wrong. For each question in a Cdex training program, we normally have up to nine screens containing hints and incorrect and correct responses. In other words, the program does have answer-judging capability.

Apparently one of the disks Rosch received was defective. If he had called us we would have been happy to replace it. As a matter of policy, we offer full replacement on all defective disks within 90 days of purchase.

John Noon
Manager, Product Development
Cdex Corporation

Winn Rosch replies:
Noon apparently missed my point about including a lesson on how to load a diskette on a training diskette. If the disk is running, somehow the user managed to figure out what it was, how to put it in the computer, and how to get it operating. If someone has already performed that task, why bother telling him how to do it again? I did mention, later in the article, that instructions for getting the lessons up and running are included in the manual.

I mentioned that the program will not run on an XT primarily as a warning for XT owners. At the time that I wrote the review, an XT version was not, to my knowledge, available.

Perhaps I missed the "up to nine screens of hints and correct and incorrect responses" because I didn't make the right mistakes.

A Weighty Problem Solved

I have read with interest the many letters from PC readers concerning the size and weight of *PC Magazine*. The latest issues weigh in at about 3 pounds, and it seems that the magazine will continue to grow.

The size of the magazine has led to the problem of storing copies—an issue that is getting, quite literally, out of hand. I originally stacked my issues side by side, but the larger issues have begun to fold and bend. So I tried having my 7-year-old son Ian hold the PCs in place while standing at attention, but he eventually started to bend and lean too, under the weight of the magazines.

Next I tried placing the volumes one on top of the other, but that resulted in a weight-lifting problem; it always seems that the issue I want is at the very bottom of the stack.

Here, then, is my solution. The individual volumes of PC can be placed between books on a bookshelf, spaced at intervals of two or more books. When you pull out one PC, the entire row of books and magazines won't fall over like dominos.

My wife, Diana, has one suggestion for PC storage: "If all else fails," she says, "then throw 'em in a box."

Bil. Alvernaz
Santa Barbara, California

Enough, enough! Read "From the Editor's Screen" on page 39 for the announcement to our readers cleverly hidden at the end of the column.—Ed.

Fixing Multiplan

In "Letters to PC" in the July issue, one of your readers noted that he was unable to load *Multiplan* onto a fixed disk ("In All Fairness . . . ," PC, Volume 2 Number 2). I am sure your readers will be interested to learn that IBM has recently issued a utility diskette that enables *Multiplan* to be placed on a fixed disk.

Owners of IBM Personal Computer *Multiplan* may obtain a copy and a backup copy of the utility diskette from an authorized IBM PC dealer.

Jeannette Maher
IBM
Boca Raton, Florida

Mail Order Marvel

I recently answered an ad in PC for a product called *Textra*, a word processing program offered by a company called Ann Arbor Software Associates. The program sounded as if it would suit my needs, so I called the company and ordered a copy. I was promised that it would be shipped by Federal Express the next day.

A week passed, and no *Textra*. When I called Ann Arbor Software, a secretary listened to my complaint and said she would find out what had happened.

Within 10 minutes, news of my lost order had reached the higher-ups, and I received a phone call. I was assured that the company was very embarrassed to be starting off on the wrong foot with a new customer. The program would be shipped to me via "next day" air service, at the company's expense. I was speechless.

The software was in my computer and working in less than 40 hours. There are some mail-order firms that do back up their promises, despite the horror stories that have circulated.

Robert Hafernik
Houston, Texas

PC Goes Continental

I have been reading through PC with much interest and have found the list of user groups. Do you have addresses for PC user groups in Europe, particularly Switzerland?

Jacob Ruegg
Zurich, Switzerland

We don't have any information about European user groups, but we'd be delighted to hear from foreign readers who do.—Ed.

Parity is Priceless

Technical Editor Bill Machrone's comment that "the fail-safe approach . . . taken by IBM and other manufacturers is laudable, but unnecessary" is naive, as is his contention that "it's only a stop-gap on the way to full error-correcting memory" ("Eagle Has Its Eye On The PC," PC, Volume 2 Number 3).

A moment's reflection should convince anyone that "full error-correcting memory" is impossible in a finite machine. The check bits are also subject to error. The best we can hope for is m bit error correction and n bit error detection (where m < n). IBM's parity checking is zero bit correction and one bit detection—the simplest possible form.

Machrone writes, "Without parity, the Eagle lets the user find out about memory problems in the usual ways: memory tests, program execution errors, and mangled words in your documents." This assumes only permanent errors or the user's unending ability to recognize invalid output. Perhaps Machrone only uses his PC for word processing; an Eagle may be fine for him.

I'm using my IBM PC to construct an intelligence-amplifier for oncologists treating multiple myeloma (terminal cancer of the bone marrow). A false negative trend in computer cancer growth at a given level of chemotherapy could lead to an untimely death. Other PC users might "only" lose their business—a high price for the few dollars saved by omitting parity.

Charles R. Blair, Sr.
Townsend, Tennessee

Bill Machrone replies:
Accountants use double-entry bookkeeping. Skydivers wear two parachutes. Serious computers correct single bit errors and detect double bit errors. They also log soft memory errors for service and correction, not halt. I hope your program or, if you prefer, intelligence amplifier, is at least as redundant as the above examples. I wouldn't recommend an Eagle PC to control machine tools or life support equipment, but neither would I recommend an IBM PC.

Camera Shy

I was very pleased to see images created with *Kaleida*, our interactive kaleidoscope generator, featured in PC's recent

How FORTH level 2 makes your PC 412% more powerful

What used to take 40 hours can now be done in 7.8 hours — that's 412% — and it is only one way of measuring power. There are others — convenience, debugging ability, run-time, compile-time, memory size . . . name it! FORTH level 2 will increase your power because it provides an interactive, integrated environment which promotes immediate debugging and modular design. Other benefits such as real-time performance depend on the quality of the implementation. Not all FORTHs are equal, so compare before buying. This one is a subset of polyFORTH, designed by FORTH, INC., tested and proven in the field for more than 5 years.

At last it is available at an affordable price of **$149** — and features the following:

- **Multitasking**
  Any number of background tasks. Concurrent operation of monochrome and color monitor. Concurrent printer operation.
- **Compatibility**
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  As well as over 700 pages of supporting documentation including *Starting FORTH* by Leo Brodie and 360-page *User's Manual*.
- **Turnkey-compiler™**
  Utility for making binary turnkey applications. Such programs can be resold without license fee under specific conditions.

Options:

■ 8087 support	$120
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This is not a complete list and you may have questions not covered in this material — give us a call! We will address them and send you a brochure.

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Letters To PC

test of video cameras ("Points of View: Comparing The Cameras," PC, Volume 2 Number 3).

Since no software credits were given, perhaps some of your readers are curious as to where they can obtain *Kaleida* and/or some of the other software mentioned. *Kaleida* is available exclusively from Once Begun Computations for $12, postpaid.

M. Gary Cohen
Proprietor, Once Begun Computations
Searsport, Maine

Stunning

Congratulations on a job well done. Karen Cook's "In Search of Computer Training" is a stunning article and reflects much of the same opinion in and around our user circles (PC, Volume 2 Number 3). Equally stunning was the model who posed on the cover and on page 90.

Once again thank you for a most informative article.

Craig R. Foote
Rochester, New York

I Am A Screen Camera

We at Lang Systems applaud Winn Rosch's article "Points Of View: Comparing The Cameras." Using 35mm slides for presentation is a logical and cost-effective use of the PC's capabilities.

The following additional points may be of interest to anyone considering the VideoSlide35:

1. When the factory setting (for Eastman Kodak Ektachrome 200) is used, the exposure time is 12-18 seconds.

2. The Lang recommended setting for Ektachrome 64 blue exposure was much too long, as Rosch's tests showed. This has been corrected.

3. An optional adapter back permits use of Polaroid SX-70 film in addition to 35mm.

4. Both the RS-170 and TTL interface boards are available with raster fill. The raster fill control is a potentiometer accessible through the interface board face plate.

5. All three exposure phases (red, green, and blue) may be previewed by pressing the start button with the 35mm camera switched off. This also checks the operation of the color wheel.

6. An NTSC interface for the VideoSlide35 will be available in October. All interfaces are user changeable.

Thanks for a well-done equipment review.

William Cliff
Sales Manager, Graphics Products
Lang Systems, Inc.
Menlo Park, California

Compaq Clicks

In his review of the Compaq computer ("Compaq: Getting There Isn't Half The Fun," PC, Volume 2 Number 1), Corey Sandler bemoans the failure of the documented method for adjusting the loudness of the key clicks. I had the same problem until my research took me into the keyboard routine contained in the Compaq ROM.

There I discovered that the documentation is close to the proper method, but not quite right. You must press the Ctrl and Alt Keys together with the plus (+) key to include the volume, or the minus (−) key to decrease it.

Ken Snapp
SofTool Systems
Denver, Colorado

Correct Me If I'm Wrong . . .

I was very disappointed to see such a concentration of errors in a single article as in "The Great 5.25-Inch Disk Drive Shortage" by Todd Katz (PC, Volume 2 Number 2). The errors indicated that the author didn't bother to do his research.

For starters, it's the Victor 9000, not

6000. The screen resolution is 600 × 400, not 600 × 300. The floppy drives store 600K at single density and 1.2 megabytes at double density.

Bob Gallagher
Northfield, Illinois

Todd Katz replies:
I stand corrected regarding the errors that Gallagher kindly pointed out. To set the record straight, and according to the Victor 9000 operator's reference manual, the screen resolution is actually 400 × 800 pixels in the graphics mode. The floppy disk drives store 600K single-sided and 1.2 megabytes double-sided (not single or double density).

Talk Talk

Stephen Manes' comparison of Freeware's *PC-Talk III* and Hayes' *Smartcom II* was thorough and fair ("Remote Possibilities: The Latest Line On The Heavy-Baud," *PC*, Volume 2 Number 2).

There is, however, one apparent bug in *PC-Talk III* of which some terminal program users may want to be aware. In version 830424 of the 128K compiled program, a configuration of 300 bits per second, seven data bits, one stop bit, and no parity will hang (no pun intended) the autodial function. Although the DIALING prompt appears, no dialing takes place.

Changing all parameters except baud and parity made no difference; changing only parity (to odd) solved the problem. If users must use seven data bits with no parity, the keyboard dialing option will work.

According to the on-disk documentation, the program will support no parity if an eight-data-bits configuration is used to transmit a binary file.

That very small problem aside, I feel that *PC-Talk III* should be the de facto standard for the industry.

Andrew Fluegelman should be commended for this program and for the Freeware concept.

Chris Bagdikian
Bakersfield, California

Taking On Technobabble

Hold the mail bag, Maude. Corey Sandler rattled my cage with his editorial on technical writers ("Documenting An Infinite Number Of Monkeys," *PC*, Volume 2 Number 3).

Few of us who style ourselves wordsmiths would argue with his implied thesis: tech writers, on the average, are a simian lot. After all, most of us emigrated to the profession by imitation; schoolhousing was not a prerequisite for the zoo.

Examples of incompetence abound. Consider the case of a technical productions manager who insisted that his writers produce first-rate instruction manuals without firsthand knowledge of the product. Naturally, publications from his group were light on operating instructions but heavy on procedures for inserting plugs into wall outlets.

If we continue to concentrate on the absurd, though, we do little to close the gap between the writer and the end-user. Instead, let's take a close look at any technical publications department. In most organizations, it reports to engineering or marketing. Even if it's the latter, the department head will generally be an engineer who abandoned the workbench for the amenities of carpet row. Most engineers shun the written word.

Time is also a major factor in our race toward incomprehensibility. Try telling engineers that the average 100 page manual takes three or more months to publish. They cannot comprehend the impossibility of writing, illustrating, editing and printing a 25,000 word document in 2 weeks.

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Letters To PC

tions departments fall near the poverty level. With all the modern tools at a technical writer's disposal, many are forced to labor under Stone Age conditions. Pencils and paper are for writers, one engineering manager thundered as he vetoed a purchase request for a used manual typewriter. That manager got what he paid for.

Put all these factors together, and it is a wonder anything gets published at all. Until engineering managers learn to recognize, demand, and pay for quality writing, you ain't got no chance, nohow.

Gary C. Gray
Grapevine, Texas

I take exception to A. Scott Earle's recommendation that "literate idiots" with no technical knowledge team up with "techno-geniuses" to write user manuals ("The Literate Idiot: A Reader's Best Friend," PC, Volume 2 Number 3). I have been a professional writer/analyst in data processing for over 10 years and have authored numerous publications including user's guides and reference manuals. In my opinion, the causes for the poor quality of commercial user documentation are numerous:

1. A reluctance on the part of corporate management to acknowledge the importance of documentation to the success of their product.

2. An insufficient number of experienced, professional technical writers with strong technical backgrounds and good communications skills.

3. Poor project planning.

4. A general lack of understanding on how to present technical information so that it is easily accessible and understandable.

The solution is to leave the job to a professional writer/analyst who understands the technical aspects of systems and how best to present them to the user(s) at hand. This specialist should be an integral part of any development team, not someone brought in at the end when it's too late.

Mr. Earle's rule would cause an already poor situation to become worse. Instead, consumers who happen to purchase a poorly documented product should return it to the vendor with an explanation—and a demand for a full refund.

Jim Crawford
Documentation Specialist
CENTEC Corporation

Regarding two articles in your August issue: "Why Computer Manuals are Driving Everyone Stark Raving Mad" and "The Literate Idiot: A Reader's Best Friend": HOORAY! We've been saying the same things for 6 years.

Let engineers build the systems and let writers write the manuals. I have nothing against engineers. As a writer, I would never attempt to design the hardware, so why expect engineers to write the manuals?

Francine Scherger
President, Communitec, Inc.
Ann Arbor, Michigan

Corrections

Due to a production error, the "Databasezero" cartoon (PC, Volume 2 Number 4) may have appeared to be part of the advertising package from AST Research, Inc. This was not the case, and we apologize for the error. Further, we apologize to readers who objected to the content of the cartoon. "Databasezero" has been discontinued.

In the same issue, in "Start Spreading the News," the name of IBM's Director of Software Publishing was misspelled. We apologize to Joyce Wrenn.

The price quoted for the Mastergraphics Adapter, $579, refers only to the board itself and does not include additional options modules as described ("New On The Market," PC, Volume 2 Number 4).

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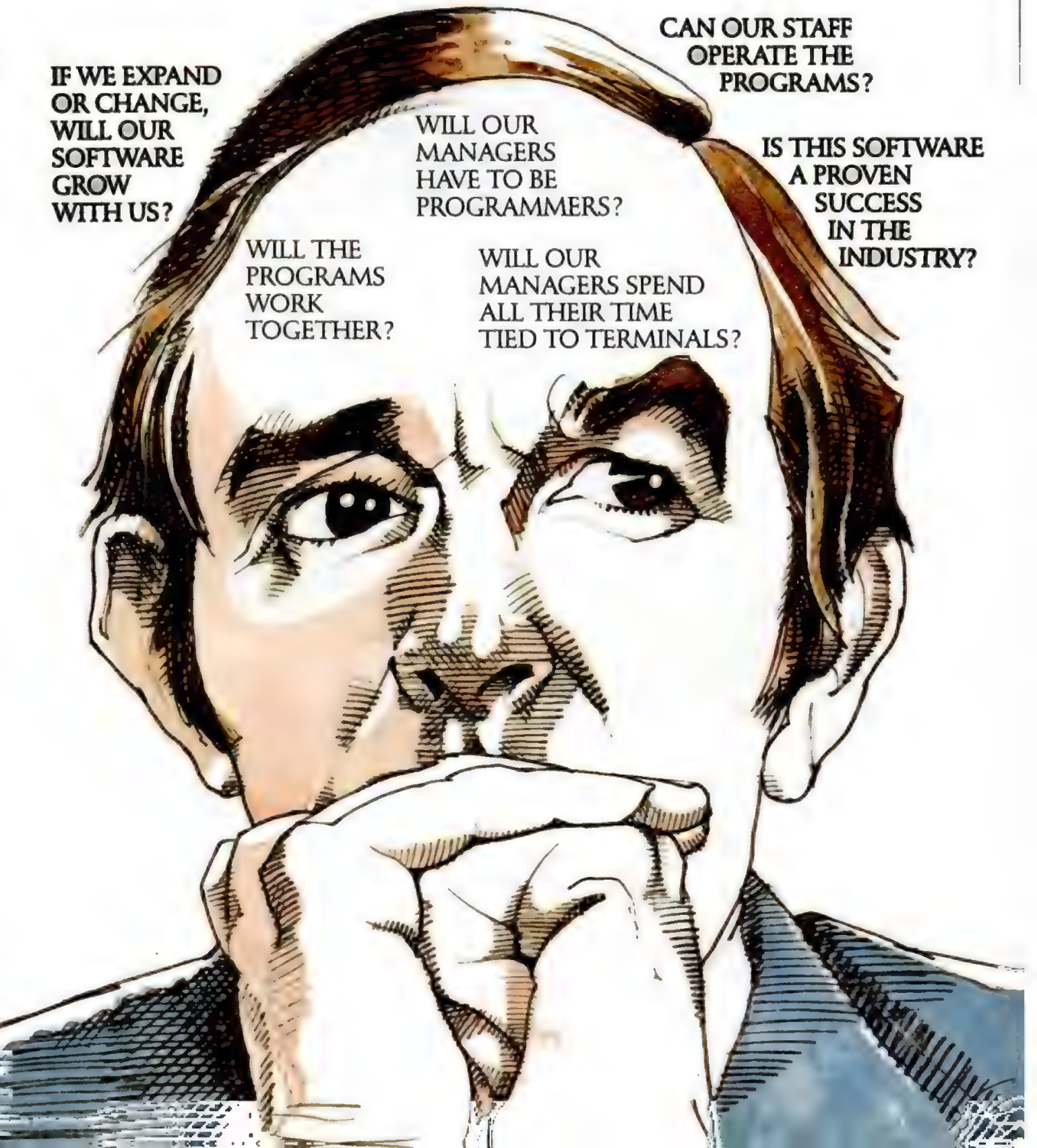
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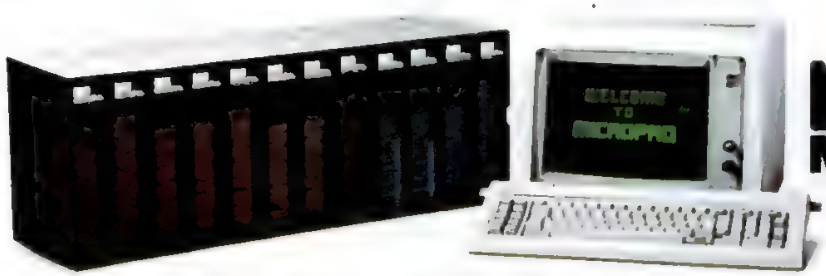


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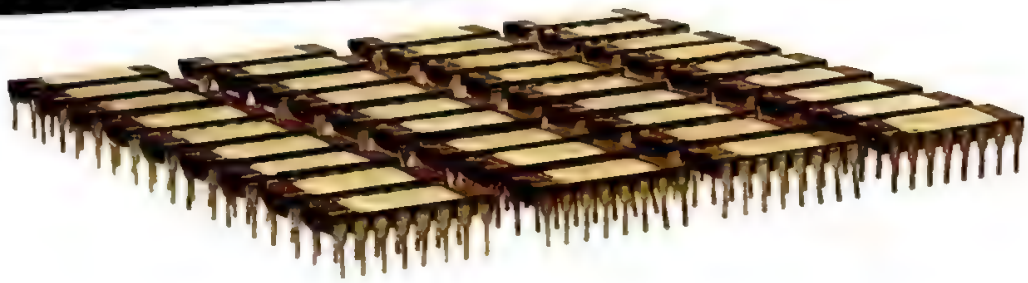
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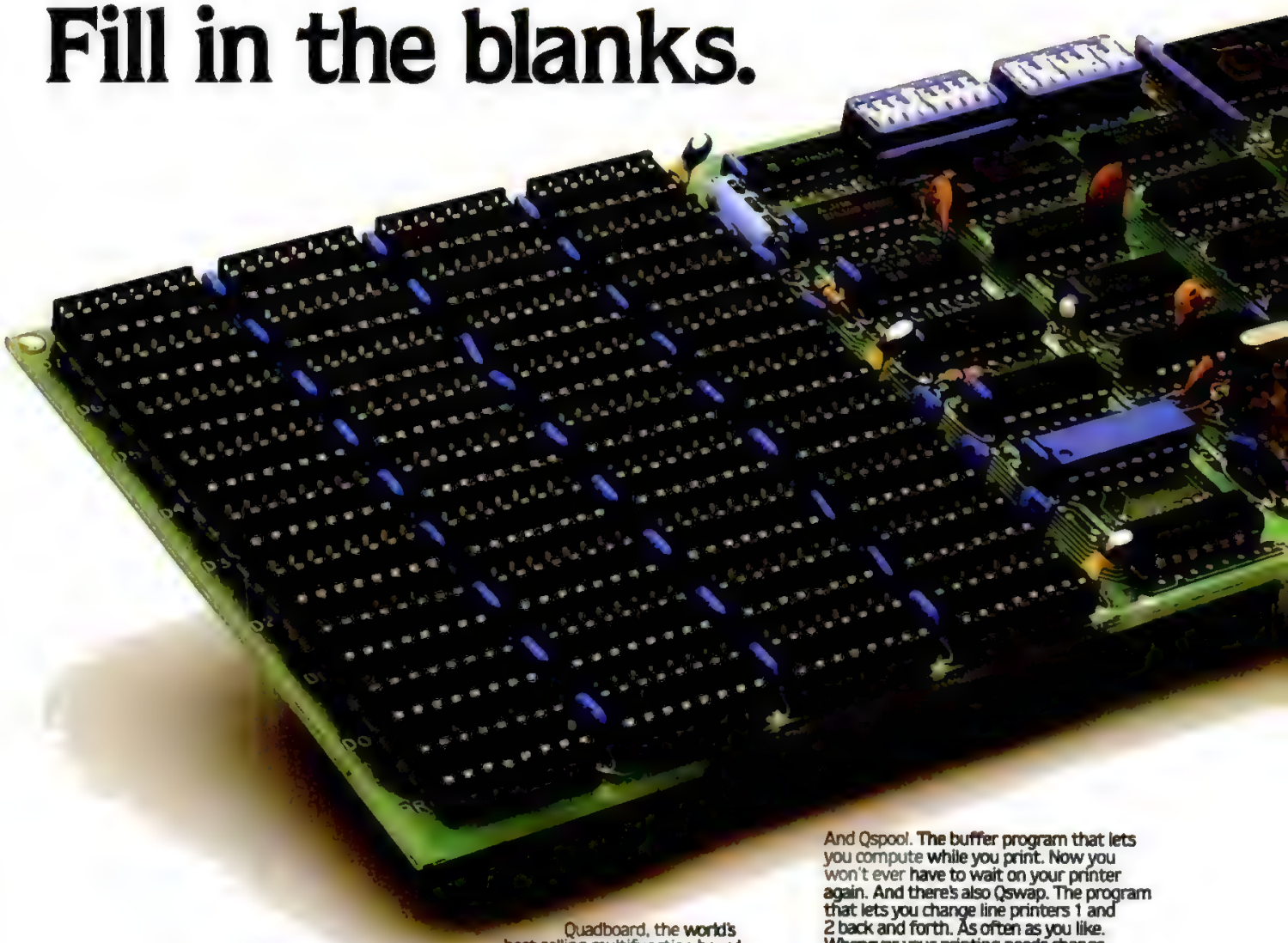
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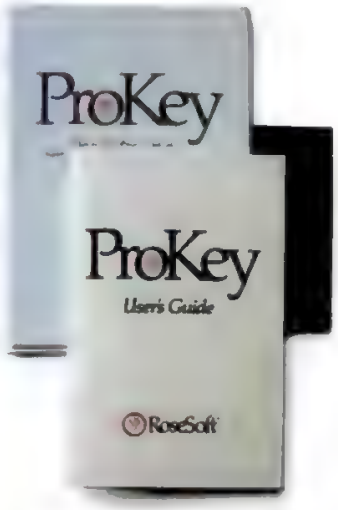
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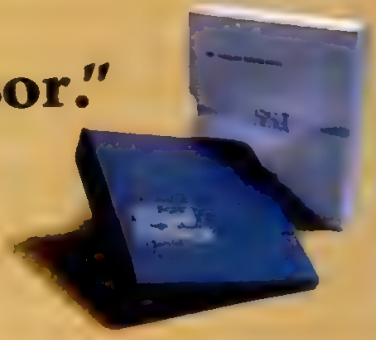
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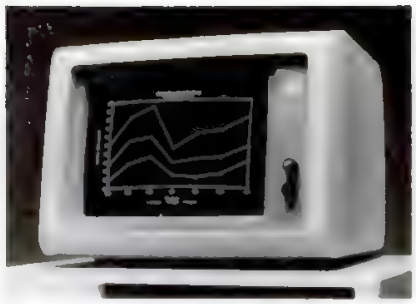


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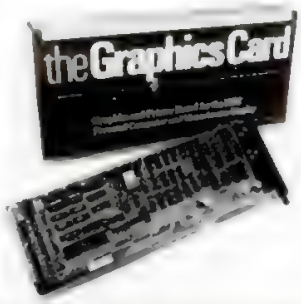
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CIRCLE 490 ON READER SERVICE CARD

PC-Communiqués

A compendium of facts, news, opinions, gossip, inside intelligence speculation, and forecasts about IBM Personal Computers.

Debate Over Software Numbering Schemes

The lack of standards in the microcomputing industry has plagued manufacturers, retailers, and users. Now, however, a standard computer Software Number Subcommittee of the American National Standards Committee (ANSC) Z39 (which oversees standards for the library, information science, and publishing fields) is struggling to devise a standardized method for identifying and codifying software. This subcommittee expects to issue its final recommendations by the end of 1983.

The 14-member committee includes book publishers, software manufacturers, and industry trade-group spokesmen. There's also a representative from R.R. Bowker, the United States administrator of International Standard Book Number (ISBN) product codes. ISBN codes, used almost universally in the book publishing industry, convey such information as a book's country of origin and its publisher.

The charge of the subcommittee is to design a standard numbering system for software developed for mainframe, mini-, and microcomputers.

Sandra Paul, chairperson-elect of the ANSC Z39, said, "The industry itself is diverse, ranging from large publishers to small entrepreneurs, and the software products sold must be identified, not only by publisher, but also, possibly, by language, minimum hardware configuration, operating system, and edition."

According to Emery Koltay, R.R. Bowker's ISBN representative, his company has already begun issuing prefixes for software and expects to continue doing so. Implementing its existing system, he argues, will save bookstores that sell software millions of dollars.

Michael Fraser, of Peachtree Software, argues that the ISBN system may be too simple for use with software. "Software packages aren't books." Fraser advocates "a system that would allow a retailer to look up a given numerical category in a book and see what products fall into it." He admits, however, that Peachtree's in-house numbering system, which assigns a 17-digit code to each package, may be too complex.

The Elsevier Science Book Publishing Company and WIDL Video in Chicago also publish numerical listings for software. SoftwareLand, a newly incorporated software retailer, is encouraging software vendors to use Uniform Product Code (UPC) symbols—the bar codes seen in grocery stores.

Another participant in the software identification scramble is the Technique Learning Corporation. Its president, David Cohen, see no conflict in his chairing the ANSC's software numbering subcommittee, nor in his company's announcement of yet another "software market identifier." "The majority of software cataloguers and many large software vendors agree that they will accept whatever standards the subcommittee decides to adopt."

In the meantime, software number systems, like software packages, will continue to proliferate.



PC Combatible

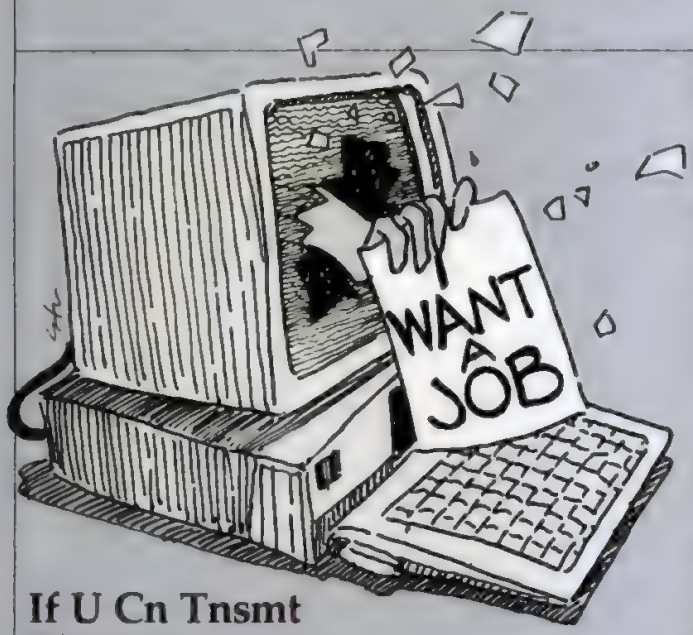
When a "Parity Error 1" message tells you that everything in your PC's memory has suddenly gone away to Data Heaven, what's your instinctive response? Logically enough, you want to punch the system's lights out.

While this action might bring immediate gratification, it could have expensive consequences. A safer way to transmit your "Basic Aggressive Units of Dissatisfaction" (or BAUD), at any rate, is now available. The Byte Bat is a 17-inch-long, foam rubber baseball bat dedicated to providing a harmless means of hitting computers and terminals. The Byte Bat is compatible with all computers and operating systems—including the IBM PC.

This frustration shunt device, along with warning stickers reading "This computer-friendly liveware is protected by Byte Bat," is available from MicroTie Systems Corporation for $12.50 postpaid by calling (800) 227-3900 or (800) 632-2122 in California. *–James Langdell*

Illustrations: Stuart Bradford

PC-Communiqués



If U Cn Tnsmt Ths Msg, U Cn Gt A Gd Jb

This year, the General Electric Information Services Company inaugurated a system that was supposed to circumvent some hassles in the job-seeking process. GE's Space Systems Division wanted applicants with experience in engineering and programming disciplines. To find them, the division placed a help wanted ad in *The Washington Post* on June 19 that instructed applicants to transmit their resumes through personal computers to the division's headquarters in Valley Forge, Pennsylvania, where the resumes were automatically stored in a personnel database. GE's recruiters can, quite literally, screen an applicant's resume and print it out if it seems promising.

Eventually, GE plans to implement a two-way bulletin board service that will enable job seekers to call up lists of available positions with their home computers. According to GE, the system will allow talented professionals to "quickly plug into the employment mainstream."

The only trouble is, although the resume data flowed rapidly into GE's computer, the employment mainstream proved to be as sluggish as ever. A GE spokesperson said the quality of applicants who responded to the initial ad was very high, but, 3 months later, the company was still in the process of choosing an employee from its electronic file.

A second ad soliciting resumes via computer won't appear until the first position has been filled. It appears that the job-seeking process is still slow, even in this modem age.

—*Karen Cook*

The People's Peanut

At last we've learned what the long-awaited IBM Peanut is really like. We were surprised that the computer had no keyboard; IBM made this design decision after seeing a survey showing that more homes had telephones than typewriters. Therefore, the input device is a ten-hole rotary dial linked to a mouse with three buttons that let you select between, say, the letters J, K, L, and the number 5.

Output appears on an Etch-a-Sketch controlled by two mini-robot arms. There's also a small plasma display dedicated to presenting continuous readings of time and temperature. One application suggested in the four-color documentation (which features Garfield) is to place the computer in the oven to signal when a lasagna is thoroughly cooked. Among the bundled software is the *CrossWord Processor* and *Parallel Parking Simulator*.

The chassis includes six external slots, providing compatibility with all major videogame cartridges. The Peanut has a built-in modem that telecommunicates over CB channels exclusively.

In its search for a suitable spokesperson for the new computer, IBM negotiated with the Planters Corporation to have the rights to use Mr. Peanut in its advertising. By now you've seen the TV spots with the Little Tramp and the Gentleman Goober dancing side by side in a double-precision hat-and-cane routine.

You might have had some difficulty if you've tried shopping for the IBM Peanut. That's because it's not available in stores. Instead, place your orders by dialing an 800-number, revealed between scenes of late-night movies on television.

IBM has succeeded in creating a true "people's computer." —*James Langdell*

IBM Softens Up

IBM has found some new homes for its pastel boxes of personal computer software. Softwaire Centres International's stores, located in 18 states, are now authorized to sell IBM's line of programs. This is the first time that IBM has approved a software-only retailer to sell its range of over 50 software packages.

BRINGING COMPUTERS into the home won't change either one, but may revitalize the corner saloon.

—Alan Perlis
from "Computer Epigrams"

Adam, I'm Adam

Coleco recently settled its differences with Logical Business Machine Corporation over which company has the right to use the name *Adam* on computer hardware, but its battle may not be over on the software front. The C-4 Computer Company of Champaign, Illinois (its logo stands for "Christ, covenant, community, and change") is advertising a line of religious software. It's named after—you guessed it—Human Being Numero Uno.



"We have a lot of reasons for selecting the name *Adam* as our trademark for computer software," a C-4 brochure explains. "The name has strong Biblical roots; it reflects a concern for ALL humankind; it's related to 'beginnings' and we are producing brand new materials for a new medium with exciting possibilities. BUT there is another reason: Adam is also the name of Marty Siegel's son." Marty Siegel, it turns out, is Director of Educational Software Design at C-4.

Against these paternal prerogatives, we speculate that, in any potential litigation, Coleco might claim Adam as a direct evolutionary descendant of its *Donkey Kong*. We'll watch this story closely—and so, no doubt, will the fella or gal upstairs.

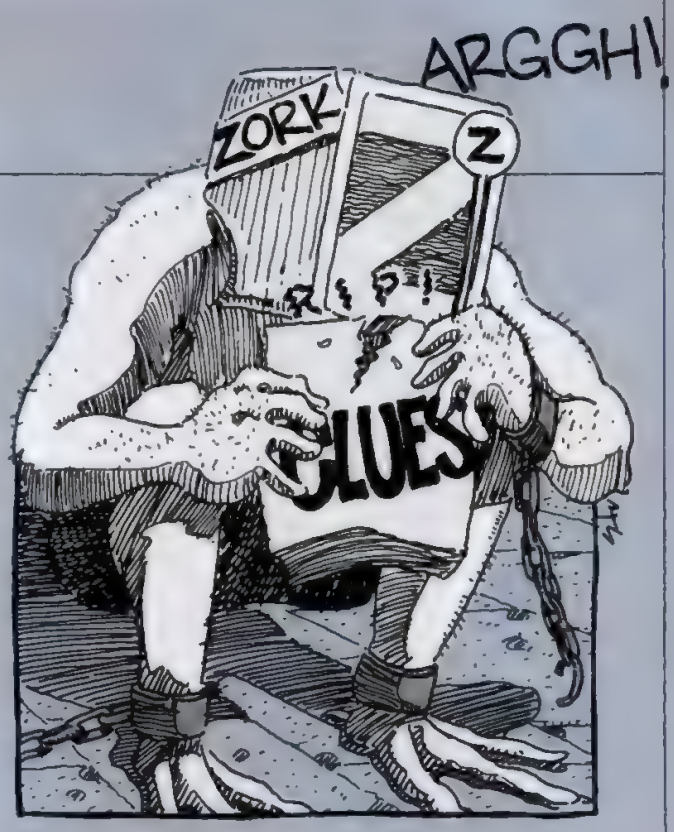
—Stephen Manes

Return of the Book

Peter A McWilliams sent us a copy of the third edition of *The Personal Computer Book*, one of his best-selling, self-published guides. The following note was enclosed:

"If you've already read it, or if you've declared a moratorium on computer books (which I myself am about to do), you can take this book to any bookstore and trade it for a real book. Maybe something by Barbara Cartland or Louis L'Amour." Our choice was Graham Greene.

If you aren't tired of seeing computer books yet, McWilliams' new volume, *The Personal Computer in Business Book*, should be a welcome sight—for the sake of its berserk illustrations, at least.



A Zork Fan Turns Pro

Have you played *Zork*, *Starcross*, *Witness*, or another of Infocom's adventure games, and reached a point where you couldn't figure out your next move? For the last 2 years help has been available from the Zork Users Group, which created booklets of "InvisiClues" printed in invisible ink so players could ration out secrets one at a time. (See "In Search Of The Exotic," PC, Volume 2 Number 2.)

In addition to providing the hint service, the Zork Users Group produced maps, posters, T-shirts, buttons, and bumper stickers in support of Infocom's games, along with a newsletter titled *The New Zork Times*. There was so much demand for the group's products that its founder (known then only as "Mike") enlisted his parents, friends, and neighbors—none of them Zork players—to help service the adventure fanatics.

The Zork Users Group was so successful that it no longer exists. On completing his MBA degree this year, Michael R. Dornbrook was hired by Infocom as product manager for its entertainment software. To avoid a conflict of interest, "Mike" folded the Zork Users Group.

In the future, Infocom, will produce maps and hint books for its own games. All of the user group's InvisiClue volumes have been rewritten. Infocom now makes a practice of creating maps and sets of clues at the same time its games are authored. The clues should be available as soon as new games are released, but the booklets won't be packaged with the software; Dornbrook said that many adventure players don't want to be too easily tempted by the hints.

The late Zork Users Group's buttons and bumper stickers might now be collector's items, but the new InvisiClues can be ordered from Infocom, Inc., P.O. Box 855, Garden City, NY 11530.

—James Langdell

PC-Communiqués

C-MU's CPUs

By 1986, Pittsburgh's Carnegie-Mellon University will require every student in every academic major to buy a personal computer, specially tailored for the school by IBM (see "IBM PC: BMOC" in PC, Volume 2 Number 3). Computers are already heavily used in C-MU's business and technical courses, but they're starting to be integrated into the fine arts and humanities curricula as well.

Aside from griping about the mandatory purchase ("Big Blue Is Watching You"), its cost ($3,000 would buy a lot of stretched canvas or history books), and the suspicion that their departments will adapt computers for useless applications, C-MU's heavily-outnumbered liberal arts students are taking the latest technological onslaught in stride.

One sure sign that the computers have woven themselves into the fabric of campus life is the popularity of computer-oriented T-shirts. One best-seller displays the university's three initials in the style of IBM's eight-bar logo; underneath is a caption that says, "You will buy a computer."

Another shirt features a slovenly undergraduate hacker standing in front of a computer and holding a bottle labeled with the Coke trademark. His motto: "No Hablo Pascal."

—*Karen Cook*

Peanut, Peanut, Who's Got the Peanut?

One premature report of IBM releasing its "Peanut" home computer appeared in the July 25, 1983 issue of *Computer+Software News*. The story asserted that Macy's New York City store would begin stocking the Peanut on September 1.

That day has come and gone without IBM making a dramatic unshelling in the Big Apple. We may have found the source for those rumors that linked Macy's and peanuts in midsummer minds.

On the afternoon of August 21, Macy's staged the "World's Largest Games," which included an attempt to round up the "Worlds Largest Assembly of Tap Dancers" and the folllowing event:

"Macy's Peanut Pool. We've put a few real peanuts in a sea of styrofoam look-alikes and whoever finds the real ones receives a T-shirt from Pelican Fashion Industries."

If the "real peanuts" referred to here were actual IBMs, this would have been a bottom-of-the-bag way to launch a new computer.

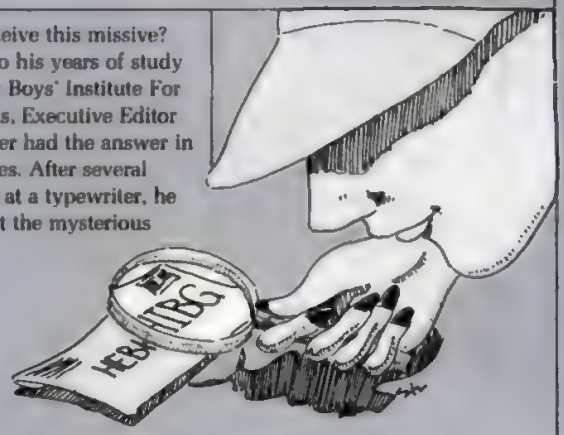
A week later, at PC'83 in San Francisco, an IBM staffer remarked, "Our booth should have been located closer to the refreshment counter." When asked why, he explained, "People keep coming around, asking for snacks."

—*James Langdell*

Encrypted Names

Some puzzling names have appeared in our office recently. First, an envelope arrived, addressed to "HEBBUFER DEHIBG." As you might guess, such a name has never appeared on our masthead. So, who was meant to receive this missive?

Thanks to his years of study at the Hardy Boys' Institute For Cryptanalysis, Executive Editor Corey Sandler had the answer in a few minutes. After several experiments at a typewriter, he deduced that the mysterious name had been produced with the typist's left hand correctly positioned, while the right hand struck keys one position away from where they should have been. This astute analysis resulted in the enigmatic envelope being safely delivered to Assistant Editor Jennifer de Jong.



Another mysterious name cropped up in the typed transcription of a taped interview. We wondered why everybody was talking about "Cynthia Matey," until we realized that her name was a phonetic approximation of "CP/M-80." Perhaps Cynthia is a cousin-once-removed of the IBM PC's own Ms. Dos?

—*James Langdell*

More Than a Box

The cables used to be sold in clay-white boxes. Then Tom Judd of Curtis Manufacturing Company, Inc. had this idea: If his company's extension cables for the PC's keyboard and monochrome monitor were displayed in clear plastic packages, the visible products could help sell themselves.

Judd investigated, and found it would cost $14,000 to create the molds to make the plastic

PC-Communiqués Pays

Do you have news, gossip, or unusual computer tales for "PC-Communiqués"? We will pay up to $50 for each submission used. You must include your name, address, and telephone number with the item. We will preserve your anonymity if you wish. All submissions become the property of PC and are subject to editing. Our "User-to-User" section also publishes and pays for readers' programs or routines. Please send submissions to the appropriate department—"PC-Communiqués" or "User-to-User"—at PC, One Park Ave., New York, NY 10016.

covers. He didn't balk at the expense, but decided that, "If I'm spending that much for these molds, they might as well make something useful."

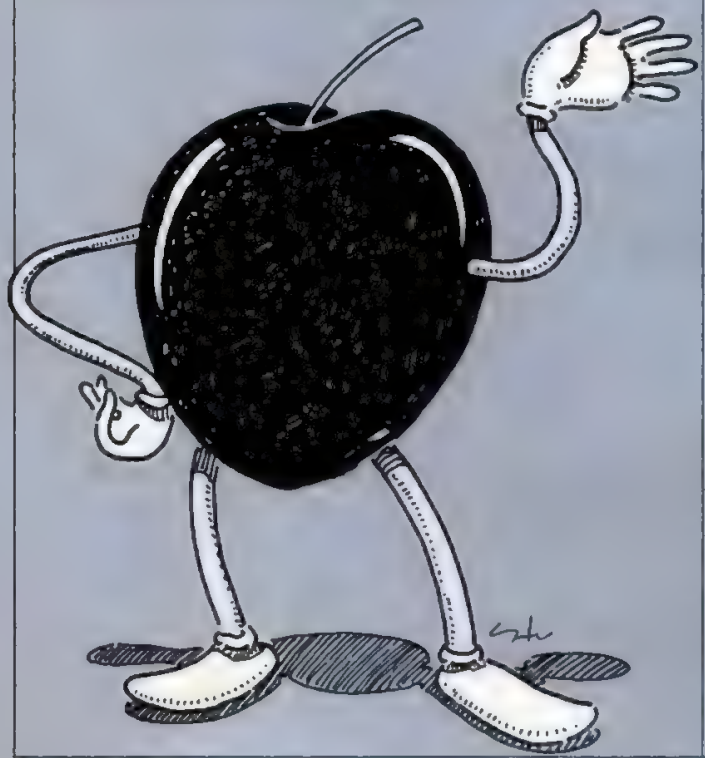
The result? If you buy a Curtis extension cable, don't throw its wrapping away. Judd designed the package's clear plastic top to do double duty as a snugly fitting dust cover for the IBM PC's keyboard. In an age when the wrappers around a hamburger usually outweigh the meat, we like to see some manufacturers think about the future of their disposables.

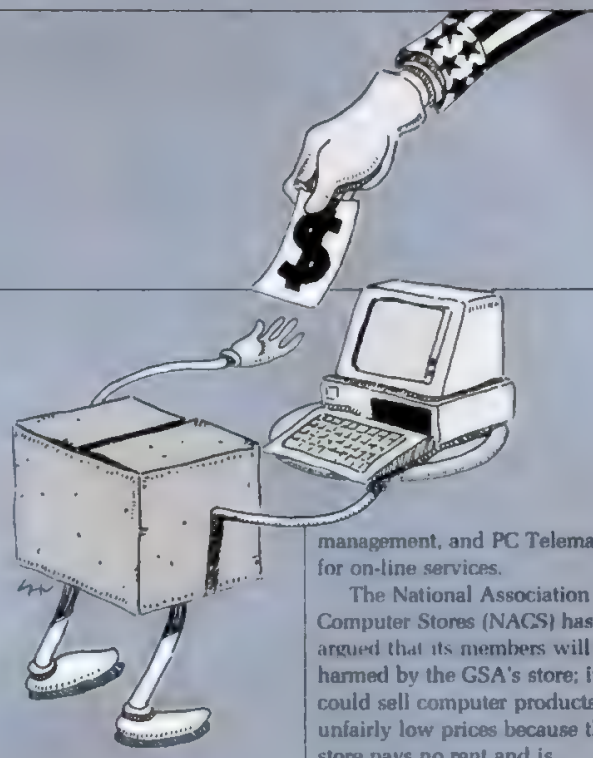
The Curtis cables themselves aren't shabby either. For more information, contact Curtis Manufacturing Company, Inc., 76 Grove St., Peterborough, NH 03458. (800) 548-4900

—James Langdell

Plumb Lines

The newest fruit on the computer newsletter tree is a *Plumb*. The name plays off Apple, of course, but the publication aims to provide a straight line to information and bulletin board services (BBS) that can be reached via microcomputer and modem. In the first issue's eight pages, *Plumb* offers phone numbers and capsule descriptions of games, hotlines, and employment services, as well as for a Pennsylvania vendor of "electronic erotica," and a "pirate board" that sells tips on beating long-distance phone rates. *Plumb's* address: P.O. Box 300, Harrods Creek, KY 40027. (502) 228-3820. A $20 subscription buys all five issues published in 1983.





The GSA's PC PX Clix

The U.S. government's General Services Administration (GSA) decided to open a computer sales and service outlet exclusively for federal agencies in Washington, D.C. In the future, it may open similar stores in 11 cities across the country. (See "The GSA's D.C. PC PX" in "PC-Communiqués," *PC*, Volume 2 Number 3.) In July, the GSA announced that Math Box, a vendor based in Rockville, Maryland, had beaten out six other bidders to operate the government's computer store. A mere month later, Math Box executives cut the ribbon to open an Information Products and Training Center in the GSA's Washington headquarters.

Math Box operates the store, which supplies 13 microcomputer systems, but has subcontracted five other companies to provide specialized services. MAI/Sorbus handles postpurchase maintenance, and Softwaire Centres International stocks the software: these two companies are among the largest in their fields. The other subcontracts are Moore Business Centers for paper and disks, M/A-COM Sigma Data, Inc. for management, and PC Telemart for on-line services.

The National Association of Computer Stores (NACS) has argued that its members will be harmed by the GSA's store; it could sell computer products at unfairly low prices because the store pays no rent and is guaranteed a subsidy if sales fall below $100,000 a year. The executive vice president of the NACS, Carroll Greathouse, fears that independent retailers will have little chance to do business with the federal government if the GSA's operation goes nationwide. His organization will keep a close watch on the effect of the initial Information Products and Training Center in Washington and may oppose openings in further locations.

Tim Rose, manager of the Information Center, disagrees. He points out that federal agencies are not required to buy from the GSA's store and that "other stores can offer the same prices we do." Rose adds, "It has not been determined that there will be more stores."

Selling computers to Uncle Sam, according to Rose, is much the same as selling them to John Q. Public. There's more paperwork, though, since everything is requisitioned by purchase orders—no one ever sees cash. Happily for Math Box (if not the NACS) the government buys a lot. While initial estimates pegged the Information Center's sales for the first year at $2.5 million, Rose expects that his stack of purchase orders will add up to sales going far beyond that.

—Karen Cook

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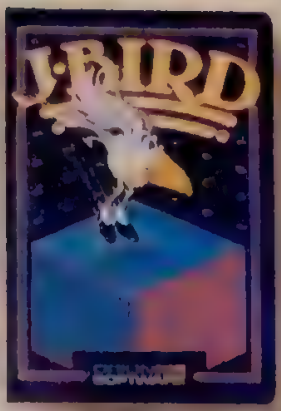
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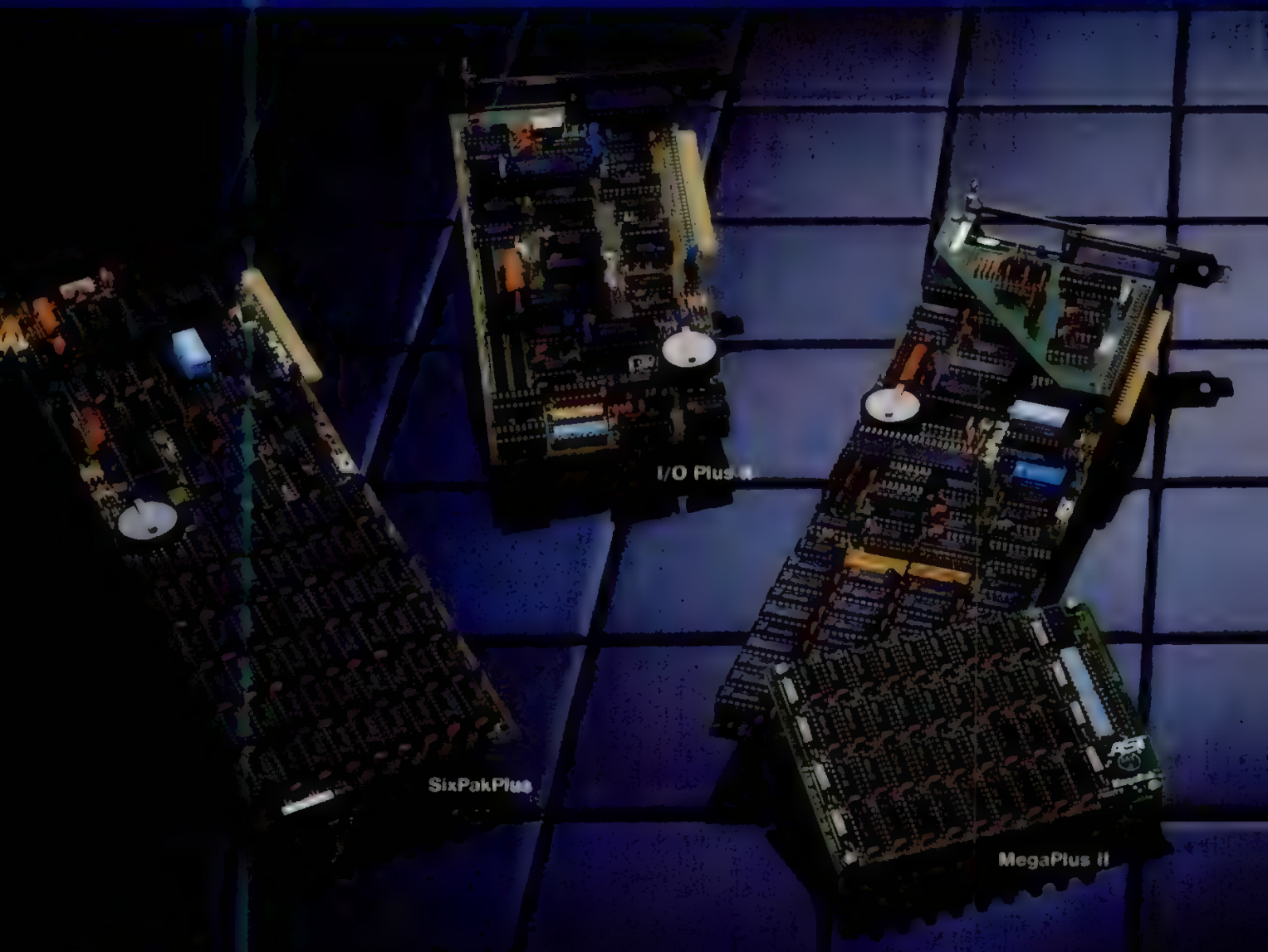
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With an AST Research Multifunction Board, you can realize the full potential of your IBM PC or PC-XT without wasting valuable slot space. By combining your memory and input/output requirements on a single card, you can take advantage of more of the capabilities IBM designed into the PC, while leaving space for future enhancements as they are introduced.

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- **Serial Ports** — By connecting a modem to a serial (async) port, your PC can communicate with other computers over telephone lines. By connecting a serial printer, you can obtain high quality print output. Other serial devices such as a plotter or mouse may also be connected to a serial port. The PC allows for the installation of up to two serial ports.



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Optional features may be added by the user at any time by installing an AST Research Upgrade Package.

All products come with extensive documentation as well as all necessary adapter cables.

	MEMORY	Serial Port 1	Serial Port 2	Clock	Printer Port	Game Port	Memory Extension
SixPakPlus	X	X		X	X	X	
MegaPlus II	X	X	X	X	X	X	X
I/O Plus II		X	X	X	X	X	
ComboPlus	X	X		X	X		
MP Expansion	X						

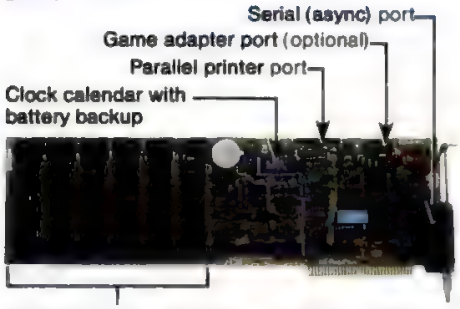
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- **AST-BSC** — A hardware/software package that allows your IBM PC to provide all the features of a 3270 or 2770 terminal in bisync.
- **CC-232** — A programmable card that allows an IBM PC to communicate in async, bisync, SDLC or HDLC protocols.

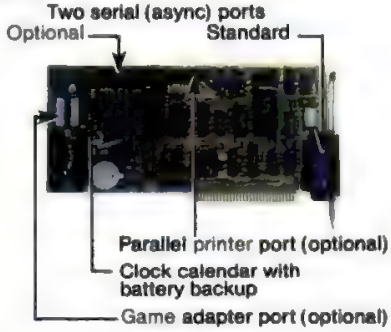


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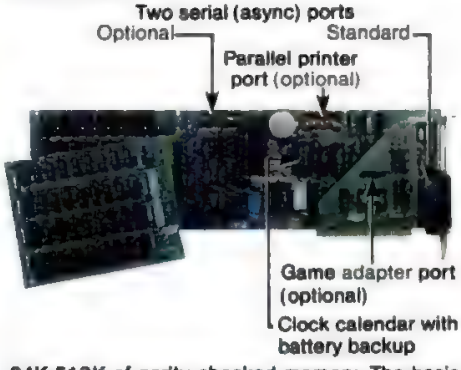


64K-384K of parity checked memory. Added to a PC or XT with a fully populated 256K system board, the SixPakPlus can bring the system memory to 640K, the maximum addressable user memory.

I/O Plus II™:

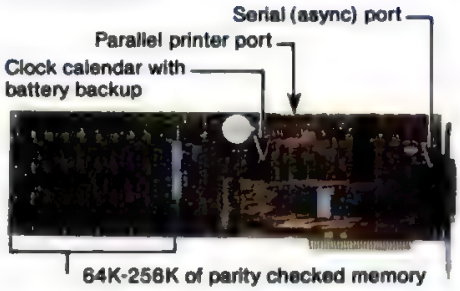


MegaPlus II™:



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ComboPlus™:



MP Expansion Memory:



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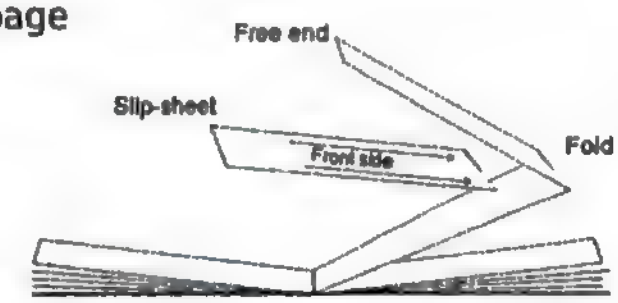
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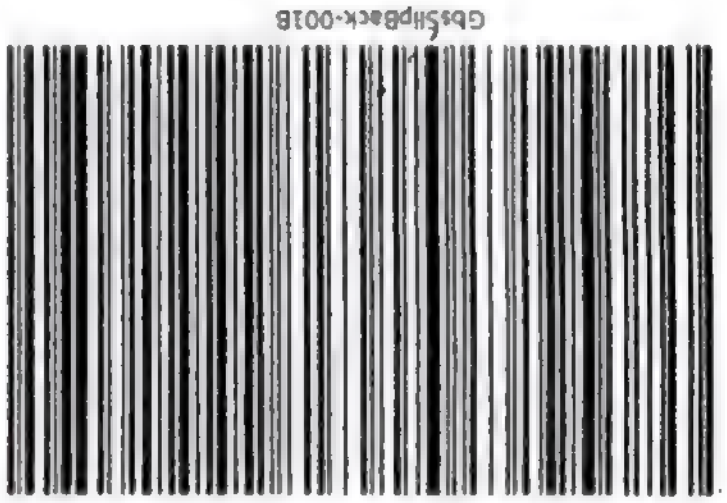
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1. Open the foldout page
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3. Slice the folded edge
4. Close the page and slip-sheet





Back

1. Follow instructions on the other side

Inverted Back

1. Follow instructions on the other side

• **Parallel Ports** — The parallel port is used for connecting a parallel printer to your PC. A parallel printer typically uses a dot-matrix output which is suitable for high-speed draft quality printouts. The PC allows for the installation of up to three parallel ports.

• **Clock-Calendar** — With the on board battery, the clock-calendar feature will maintain the correct date and time, even when the PC is turned off. This feature eliminates the need for typing in this information each time you power up your computer.

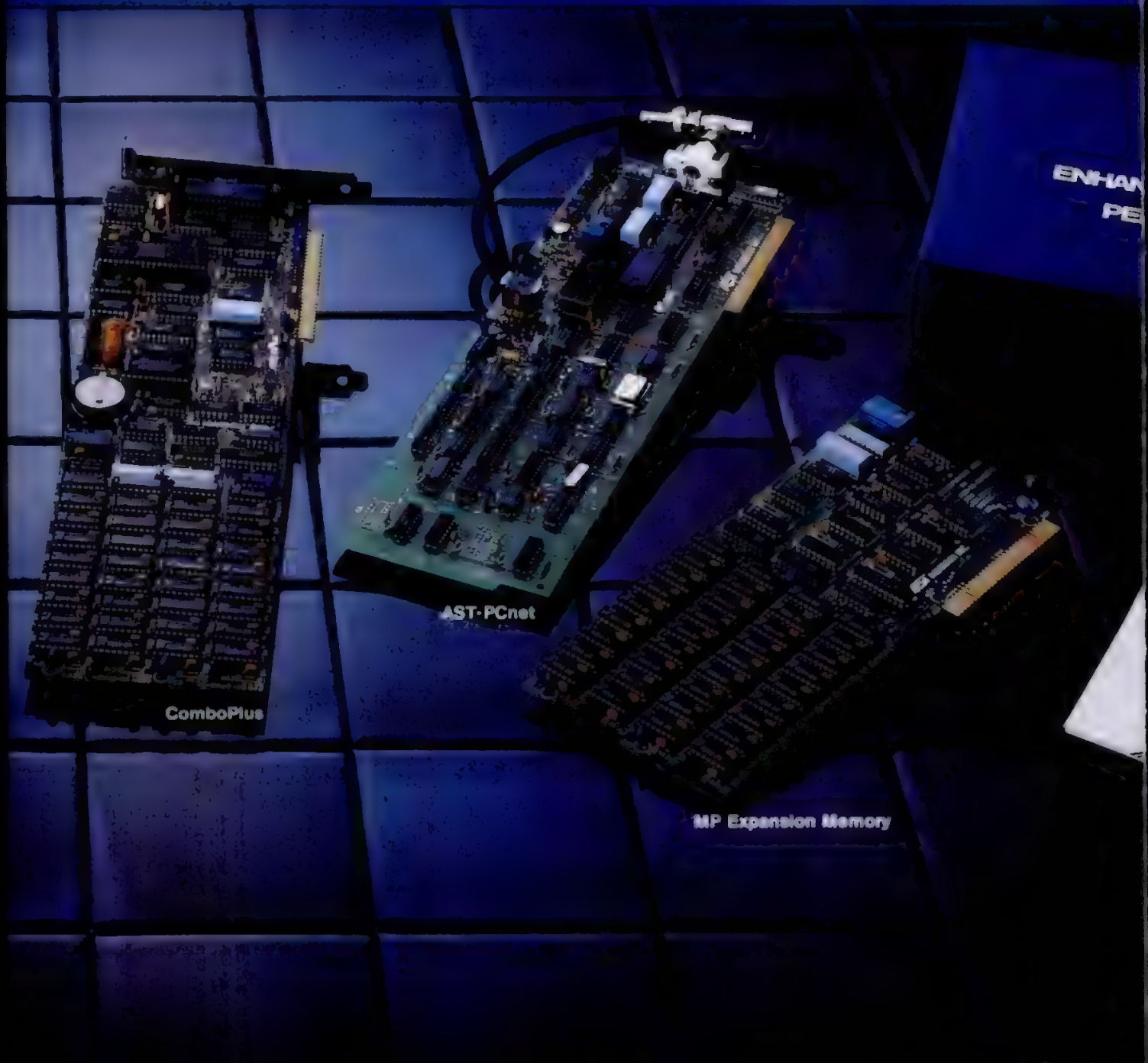
• **Game Adapter** — The game adapter port allows you to connect an IBM-type joystick to your PC so you can play the multitude of arcade-quality games which take full advantage of the PC's graphic capabilities. Or you can use the joystick input for other applications by writing your own programs.

• **SuperPak™** — Every AST Research Multifunction Board comes with an AST SuperPak diskette containing programs for setting and accessing the clock, as well as SuperDrive™ and SuperSpool™, the most powerful RAM disk and print spooler available for PC-DOS. With SuperDrive you can use your PC's memory for simulating one to four floppy drives, from 20K to 360K each. SuperSpool allows you to set aside memory (from 4K to 512K) as a print buffer; SuperSpool sends output to the printer in the background while you execute your program in the foreground. With SuperDrive and SuperSpool, you can significantly improve your PC's operating speed.

• **Proven Compatibility** — All AST Research hardware and software products are 100% compatible with all versions of the PC and PC-XT as well as the Compaq and other PC look-alikes, and are 100% compatible with PC-DOS 1.1 and 2.0.

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Defining the role of criticism in the personal computer press raises questions that have no right answers. What do readers think?

To Rate, Or Berate?

I wrote an article on some of the problems of DOS 2.0 for the July issue (see *PC Magazine* "The Dark Side of DOS," Volume 2 Number 2). Some of the repercussions of this article have given rise to an interesting topic: the role of criticism in the personal computer press.

Many of you may feel that there isn't enough criticism in the personal computer press. I sometimes have felt this way, and I've heard many people remark on the tendency of *all* the magazines in the field to publish raving product reviews, giving the impression that products are nearly flawless. But I don't think that the press is intentionally biased. One reason for raving reviews is that we're all PC enthusiasts. Frankly, I love this little computer, and everyone who writes about it seems to love it, too. Our enthusiasm for the machine spills over into enthusiasm for all the software and hardware that give our PCs the power to do so many wonderful things. Maybe enthusiasm gets in the way of writing a balanced review.

To Praise or To Damn?

The more cynical of you may suggest another reason: The press doesn't want to offend its advertisers by publishing negative reviews. Although this is possible, my experience leads me to speak for the integrity of the personal computer press. As a freelance writer, I've sent articles and reviews to nearly every magazine out there, and I've never had critical remarks about advertisers censored from an article. As a magazine reader like you, and as a writer, I can assure you that I've never read anything in the press that has led me to believe criticism was being withheld for political reasons. But in any case, critical reviews are few and far between.

Are writers neglecting their responsibility to the public in not writing balanced reviews? This is a question that we all have to mull over, and there isn't a simple answer. Product reviews should offer information and guidance, so the reader can determine whether a product meets his particular needs. The more information a review gives, the more an article tells us about its subject, the better informed we are. Reviews and articles filled with facts and information about features are helpful, but should they take a step further? Should they delve into the realm of subjective criticism, by saying

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1. RAM memory starting at 64K, user-expandable in 64K increments to 384K. This makes the **SixPak** ideal for the PC or PC-XT with a 256K system board; 384K on a **SixPak** added to 256K on the system board yields 640K, the maximum addressable user memory in these systems.

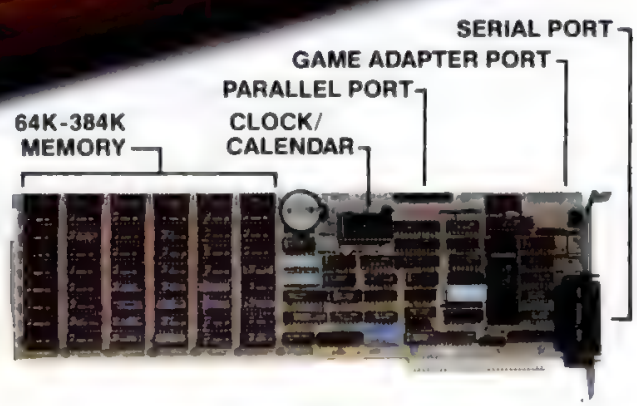
2. One Serial (async) communications port, configurable as either COM1 or COM2, for use with serial printers, modems, a "mouse," and other serial devices. The serial port has on-board jumpers for easy management of the RS-232C lines, simplifying the wiring of cables in many installations.

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5. An optional IBM-compatible Game Adapter port, for use with an IBM-type joystick. In conjunction with application programming, this game port may be used for cursor control, in generating graphics or for playing games at the end of your work day!

6. Every **SixPak** comes with an AST SuperPak utility diskette which includes SuperDrive and SuperSpool, the most powerful disk emulator and print spooler software you can get. These programs will greatly enhance the throughput of your PC or PC-XT by emulating disk drive and printer access at RAM speeds rather than the normal slower speed of mechanical devices. SuperPak is the first of such software to be compatible with both DOS 1.1 and DOS 2.0.



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"This is fantastic, but that stinks"?

If you think about this issue, you can see some of the problems that writers in the personal computer press face. Should we writers suppress our subjective evaluations, and deny readers benefit of an informed opinion, or should we spill our reactions into our writing, and possibly cloud it with limited viewpoints? Every writer faces this dilemma and answers it as best he can. What do you as readers want? What do you expect? What do you identify as your rights? The only way that the personal computer press will be able to define its responsibility to you is if you let it know.

The press has a responsibility to the product manufacturers, too. If we writers attack them for minor flaws in otherwise good products, we can do them a lot of harm. If we ignore their products' defects we rob the market of competitive pressure. What is the press' responsibility to manufacturers in praising and damning their products?

In addition, there is the time-and-version problem. The world of the PC is changing so rapidly that new versions of products constantly are appearing. But the reviewing process takes a surprisingly long time; a product must be received, tested, and evaluated before the review appears in print. If I were reviewing version 1.1 of *SuperDuperWare* and learned that version 1.2 would replace it by the time my review appeared, how would I treat the flaws in version 1.1? Point out the flaws in 1.1, and mislead readers into thinking that *SuperDuperWare* was lousy? Should I take at face value the manufacturer's claims about improvements in version 1.2 and not mention the flaws, in the hope that they would go away? As a writer, what is the right thing to do? What do you want as a reader? Which approach would be most fair to the manufacturer?

Big Guys Versus Little Guys

To show how this matter can get complicated, what about the problem of the big guys versus the little guys? You and I know that nothing the press could write would amount to so much as a mosquito bite to IBM. And an unfavorable review couldn't kill a company like Microsoft or Digital Research, either. But a little start-up company, with perhaps one product and only pocket money for capital might be put out of business by a single unfavorable review. Do the little guys deserve gentler treatment? Does their vulnerability call for kid-glove handling? Should products from small companies be held to a lower standard than those from big ones? If my word processor stinks, it doesn't make me any happier that it came from a one-man software house. Should the big guys be given all the criticism they can handle? Should the little guys be given extra room to fix the flaws in their products? Does the size of the producer change the press' responsibility to manufacturers? I find that every time I rephrase this question, my opinion changes—a good sign that there are at least two sides to the issue.

Tone is an important part of the problem of criticism in the press. It matters not only what you say about a product, but how you say it. Consider two cases in point. I once reviewed a software product that I considered to be of shabby quality, much poorer than we deserved; but the product did work, and at the time it was the only one of its kind available. In writing the review, I attempted to be objective and to show both sides, even though my overall opinion was negative. Later, when I talked to people who read the review, I realized that I'd failed to convey the product's low quality. Apparently, my tone wasn't harsh enough. So, when I wrote "The Darker Side of DOS," I toughened up; there were problems with DOS, and I wanted to make sure potential users were warned. I wasn't down on DOS—let me reassure you that I use 2.0 60 hours a week, and it suits me fine—but I was appalled by the number of problems I found in a very short amount of time. My concern was twofold. First, if I found that many problems in a few days, how many more might be uncovered later? Second, if a seasoned user like me had troubles, where did that leave the less-experienced? Out of this conviction came the breathless writing style of "The Darker Side of DOS."

But if my former review was too gentle, this one was misleadingly harsh. Lots of people have told me that I savaged DOS in my review; this wasn't my intention. The tone of critical writing, I've learned, must be finely tuned. How strongly should we talk about the good and bad features of any product? Should we be mellow, or melodramatic? Dramatic writing makes for enjoyable reading, but it may mislead the reader. Bland writing might be fair, but it can put readers to sleep. How would you have it?

I don't know the answers to the questions I've raised here; I am still finding my way through the thicket of tangled issues, issues of fairness, issues of responsibility. But I do know one thing: I expect to continue having as much fun writing about the PC as I have using it. */PC*

FRANKLY, I love this little computer, and everyone who writes about it seems to love it, too.

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CIRCLE 423 ON READER SERVICE CARD

BATTLE NETWOR

NETWORKS/BILL MACHRONE

The manufacturers of networks have been sending up smoke signals to let the world know their products are ready.

While it's often true that where there's smoke there's fire, you can get burned, too.





OF THE STARS





Are you ready for networking? Here are a few qualifiers that may help you decide. Do you have several PCs and only one letter-quality printer? Do people line up at the printer to wait for their turn? Are there several PC-equipped "stations" through which work must flow? Are you shuffling disks? Is one PC user creating information to be used by others on their machines? Do you wish all your PCs were XTs or had hard disks?

If you answered yes to any of the above questions, read on; you could be a candidate for a network.

We've seen a sudden proliferation of courses purporting to teach you how to network your micros. A course? How tough can it be? For 3 days and anywhere from 500 to 1,000 bucks, you can learn everything from the history of micros to

Photographs by Shig Ikeda

network topologies to how to negotiate the contract with your chosen vendor. Maybe there's more to this than meets the eye, we figured.

We read the ads, attended the seminars, and dropped by the booths at the shows. Yet through it all, we had nagging doubts about some of the claims being made about performance, capabilities, and price per work station. Our solution was to assemble in our offices one of every kind of network we could lay our hands on. We were tough with the vendors: "If we can't see it work on our machines in our environment, it doesn't exist," we reasoned. The vendors were cooperative. Some sent technicians, some sent marketers, but all sent networks. Our requirements were simple: Just tie two PCs to an XT. This, we figured, was the bare minimum configuration we would want as a foundation for a network. When we actually set them up and ran them, we expected the results to be interesting, and we found more than a few surprises.

In order to test the networks, we devised a group of standard tasks that would be either real-life examples or measurements that would indicate how the networks were likely to perform in real situations. The first thing we wanted to test was how well the network provided shared access to large, commonly used programs. These could be anything from a word processor to a compiler or a spreadsheet program. We chose *WordStar* as our benchmark for this test and measured the amount of time necessary to load it over the network from a hard disk file server.

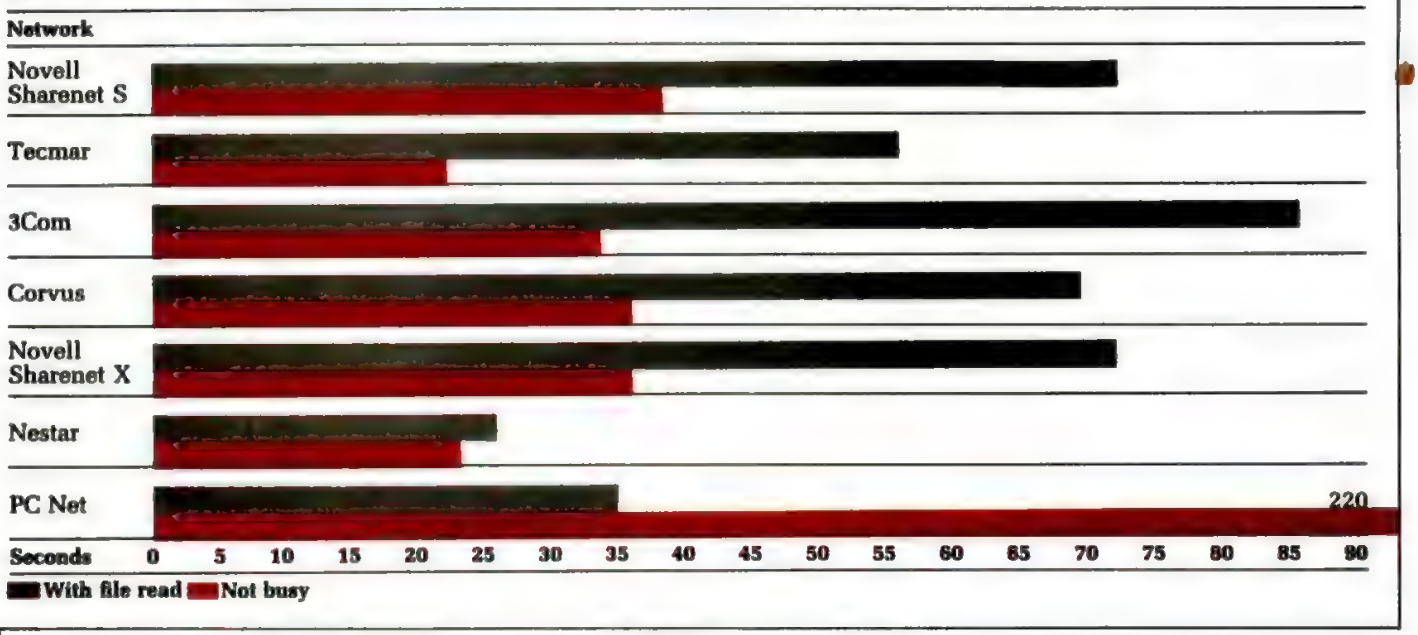
Do you wish all your PCs were XTs or had hard disks?

Our next test was to see how fast we could pump out characters from the printer port of a print server and to what extent activity on the network slowed the printer port. For this, we built an "infinitely fast printer," which acknowledged characters as fast as they were transmitted and counted the number of characters sent in 1-second or 10-second intervals. A short compiled BASIC program LPRINTed a character pattern continually.

The first of our file-oriented tests was another BASIC program, which continually created files in random access mode. Each record was 1,024 bytes long, and the file length was 20 records. We recorded the time every ten times the file was created. Another test read 20 records at a time from a file of 1K records, and here, too, we checked the time every ten repetitions.

Finally, we combined tests to see what effects they would have on each other. What constitutes reasonable performance in a network? In terms of what a file server can do, it merely needs to be faster than a floppy disk or, if speed is truly immaterial, provide more storage than a floppy disk. Can it live up to its claims? Can it share expensive resources such as fast or

A comparison of the time the networks take to read a file when the networks are not busy and when they are creating a file at the same time.



THE FILE server looks for all the world like a trash compactor. Inside, however, beats a heart of the purest silicon.

letter-quality printers? Can it keep them printing fast enough to be worthwhile? Speed may well be secondary. Who cares how many megabits per second a network can transfer, if it does things wrong?

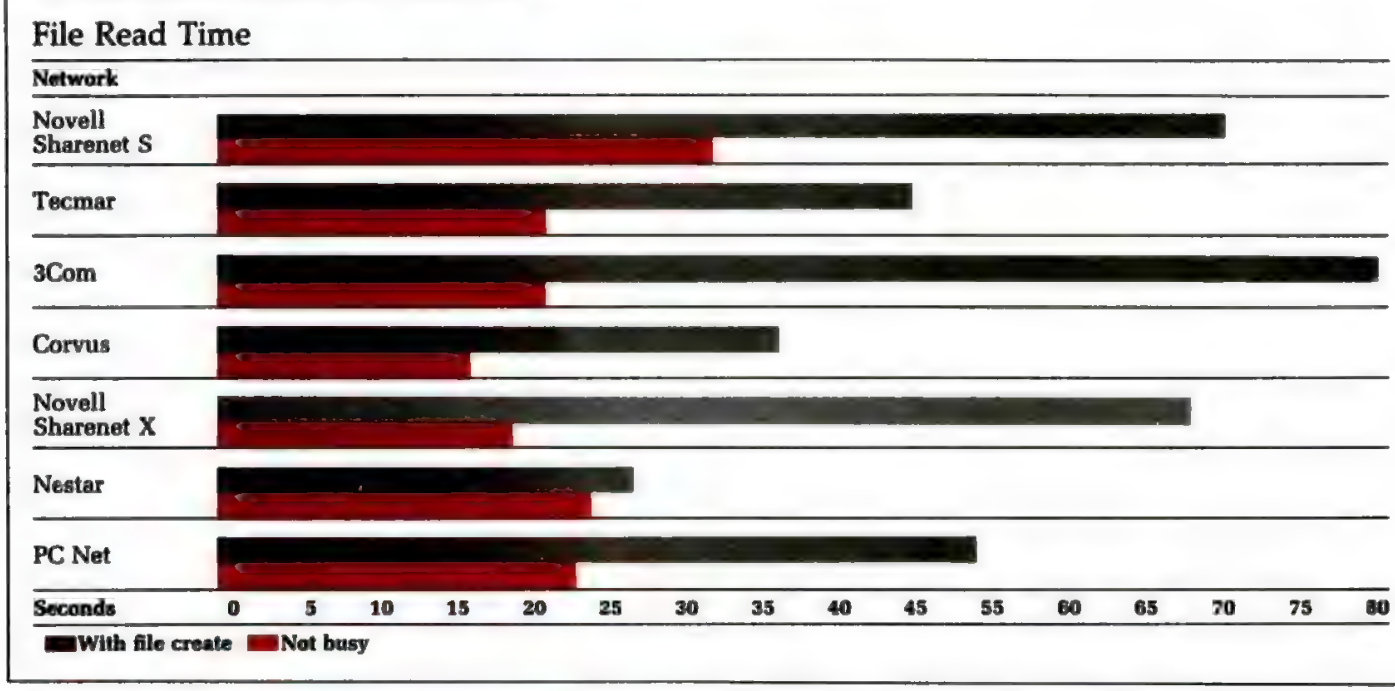
AST and Orchid PCnet

PCnet is a single product offered by three vendors. Orchid, Santa Clara Systems, and AST have a technology-sharing and cross-licensing agreement covering their network products. The network consists of a board, coaxial cable, and software. Each board has a settable 16-bit address, so theoretically a maximum of 65,535 devices could share the network, although more than ten may be optimistic. The stated speed of the network is 1 megabit per second, or approximately 100,000 characters per second. We did not test Santa Clara Systems' version of the network, so we will only describe functional differences where they exist.

One feature of PCnet is that any PC can be a server or a user. In setting up the system you specify which drives are to be private to the local user and which are to be available on the network. The file server remains usable as a work station. Any station equipped with a printer can be a print server, since each printer is given a network ID, and there is an assignment program that allows you to redirect your print output to any on the network. Security is taken care of at the drive level. If you want to keep a file private, it must be on a non-network drive. There is no real provision for file sharing, other than having one copy of .COM or .EXE programs available to all users on the network. As with other networks, that means that single-drive or even driveless PCs can be a cost-saving practicality. PCnet provides a convention for locking data files so that they cannot be accessed by multiple users at the same time. This is usually done through batch files, which set a lock flag on a given file while it is in use and relinquish it when the user is finished with it. Since PC-DOS doesn't provide any means of locking or sharing files, PCnet's conventions sit atop PC-DOS—an extra "layer" of checking required before a file can be accessed.

PCnet installed with relative ease on our PCs and XT, after we removed a few cards (a modem, some combo cards, and a non-IBM graphics card), which conflicted with the interrupts used by the AST/Orchid card. *WordStar* loaded onto a remote PC from the XT in 2.7 seconds with no traffic on the network; the time increased to 6 seconds with our file read and create programs running. The file cre-

Comparing the time it takes the networks to create a file when the networks are not busy and when they are simultaneously reading a file.



ate program took 220 seconds to execute across the network, while the read test took 23 seconds. When we ran them at the same time, the write test went up to 334 seconds, and the read time went to 54 seconds.

Since PCnet modifies the standard DOS running in your PC, it slows down all operations on the machine. For example, a non-networked XT can execute the file create test in a mere 16 seconds. With PCnet running, it increases to 80 seconds, whether or not there is a communications board in the machine. There is a similar effect on the printer. Our printer benchmark, in compiled BASIC, is capable of pumping 840 characters per second out the parallel port. With PCnet running, the speed was immediately cut to 687 cps. The fastest PCnet could send printer-destined characters to another machine was 320 cps—still fast enough to keep most printers more than busy. With the file create running, there was a precipitous drop to an average speed of 80 cps. Adding the write test to the fray cut that speed by half.

A number of findings in our tests indicated that large blocks of writes to disk tend to clog the network, while reads have much less effect. We encountered a major problem in our printer test. Since BASICA and the BASIC compiler were not designed for a multiuser environment, they do things to the network that are, at best, impolite and, at worst, intolerable to the network. Chief among these offenses is the whole printer output scheme. First, BASIC doesn't go through DOS as most other programs do; it has its own printer driver. Second, it not only clears the screen when it begins operation, it also resets the printer. If the printer happens to be a shared device, and it happens to be printing, guess what? It stops. Furthermore, a BASIC program that doesn't print "hogs" the printer, since the reset and the driver make it appear that it is using the printer. Programs with better manners, such as *WordStar*, merely relay a message from the network control software to the effect: "The printer is busy; try again later."

WordStar and other programs like it can really be hell on a network system for other reasons. Typically, full-screen word processing programs continually ask DOS whether you are pressing a key. If the machine on which you are running such a program is being interrupted by a network program, you undoubtedly will notice a deterioration in performance.

IT WAS pretty amazing to see this kind of performance over two rather ordinary pieces of wire.

AST and Orchid recommend use of AST's *SuperSpool* and *SuperDrive* spooler and RAM disk software in conjunction with PCnet. While these programs speed things up and lessen printer contention, they make the network a bit more "fragile" and more confusing to set up and operate. In addition to real drives, you also have the option of sharing RAM drives, and you have to remember which is which, especially if you are sharing memory between multiple RAM disks and spoolers. Typical of all the networks in our test, network drives are assigned over and above whatever you have defined in a local machine. So on a normal PC, if you have only the two floppies, the first network drive will be C: On an XT, however, the very same drive is likely to be D:. If you have defined one or more RAM drives on the machine, the first network drive goes further in the alphabet.

Santa Clara Systems offers a Network Cache unit for use with PCnet. It consists of a small expansion chassis, which sits above or below a file server PC and contains from a quarter megabyte to a megabyte of error-correcting memory. It buffers disk accesses, which, according to the manufacturer, increases the speed of some operations by a factor of 10. The error-correcting memory reportedly scans the entire memory several times per hour, checking for and fixing soft memory errors, without interference with normal operations.

A side effect of PCnet's design is that it's hard to get anything done on the server if others are using the disk. The server's network board, of course, interrupts the server's program every time something comes across the network. Given the time it takes to fulfill the response and get back to the task at hand, things slow to a crawl. This phenomenon is virtually unavoidable in collision-detecting networks and raises questions regarding the validity of a file server (at least one as slow as a PC) also running application programs. Santa Clara Systems' Network Cache option would lessen this problem, since accessing data in the buffers would be far less taxing on the file server than a full disk access. Along these lines, AST recommends that programs using overlays be copied down to the user station in their entirety to maximize performance. This presupposes sufficient memory in the local machine to hold it in a RAM disk. The combination of write time and potential lack of room on a floppy makes this alternative unacceptable, and it violates the purpose and spirit of networks.

AST has a new electronic mail package in the works, which was not available when we tested the network. Also, both AST and Santa Clara Systems are working on a multi document spooling program, which will be ready by the end of the year. This should eliminate any bottlenecks associated with the printer, but we don't know how it will address the reset problem while in BASIC.

PCnet has one nice, rather unique feature: the ability to run jobs remotely from another PC on the network. While such a function may have limited use, it has been developed to such an extent that the slave PC sends a signal over the network when the task you assigned it is complete.

Nestar PLAN 4000

Nestar's network system is noticeably different from virtually every other system

we tested. The heart of the system is the file server. In its sober gray vertical cabinet, it looks for all the world like a trash compactor. Inside, however, beats a heart of the purest silicon. A 68000 with 256K of memory takes care of network administration tasks, while a 60-megabyte Priam drive (the smallest available; you can go over 500 megabytes) stores your files. Topping it off is a cartridge tape drive that backs up the hard disk in 20 or 45 megabyte increments. PLAN 4000 permits as many as 255 PCs to be connected to a file server, either directly or through a concentrator. The network speed is stated at 2.5 megabits per second. Nestar's network is of the token-passing variety, meaning that each device gets its chance to speak in turn, without interruption.

Our first test yielded a 2.6-second load time for *WordStar* when the network was quiet, and which rose to 4.2 seconds when the file create and read tests were running. We added a third PC to the fray and had three copies of the file create program running at the same time. This only slowed *WordStar* to 5.0 seconds. The file create time was a quick 24 seconds, which increased to only 26 seconds when the read test was running. The read test took only 24 seconds by itself and 25 seconds while the create was running.

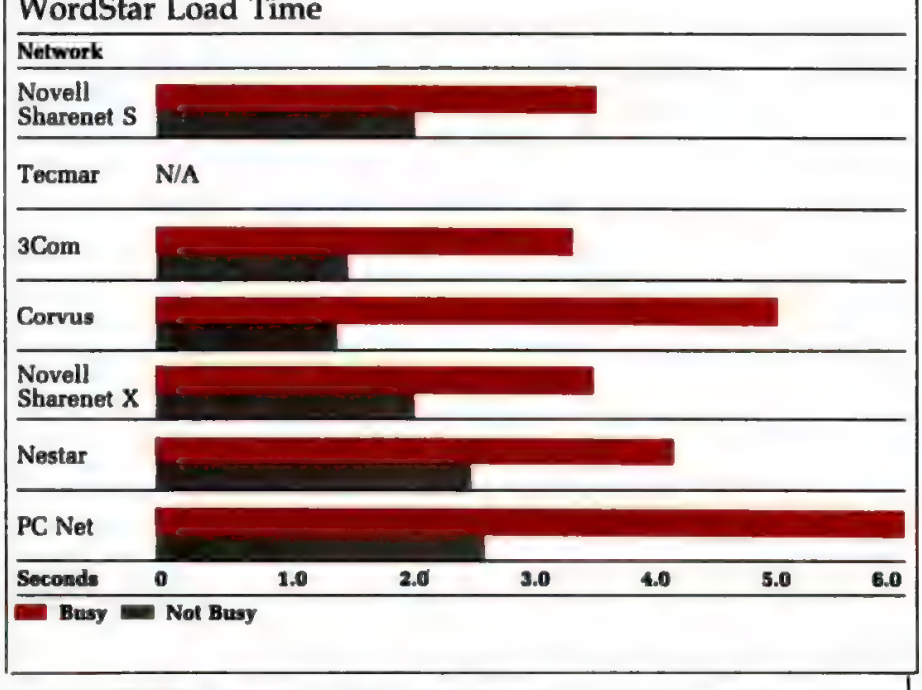
The speaker on the PC "ticks" to indicate that communication is occurring between your PC and the file server; so, even in lengthy data transfers, you know that something is happening. A unique feature of Nestar's system is that it is not limited to PCs. It supports a large variety of microcomputer operating systems, including Apple II DOS, Apple SOS, CP/M, and others. Thus, many different kinds of machines can utilize the file server and share system resources. The print server software for the PC was in beta test at the time of our trial, so we didn't get a chance to wring it out. There is a fully developed print server for Apple, and the PC system will work the same way. Our impression of the Nestar is one of quality—albeit expensive—workmanship and high performance. The degradation curve appears to be rather low, meaning that this server can tolerate heavy activity from many users without becoming objectionably slow.

Features abound on the file server. It requires a terminal for operation and needs to be brought up and shut down each day. Operation of the server requires a bit of training and expertise, as there are commands to monitor the file system, backup files, create users, set read/write permissions, and a host of other features. File protection and sharing provisions are good, and there is a sophisticated electronic mail program. Any machine in the network can use electronic mail, regardless of its make, providing a vehicle for interbrand data transfers. Another neat feature is that the PLAN 4000 can act as a gateway to mainframe systems by installing the optional 3270 communications device in the file server. The documentation is in two thick volumes, one for the server and one for the user stations.

Corvus Omninet

Corvus is the grand old man of this test, claiming to be the largest networking company in the world, based on the number of user stations running under their software. We believe them. They were on the scene early with a file server that could tie Apples or S-100 machines together over a ribbon cable to a host hard disk. They also came up with an innovative backup system for hard disks known as the Mirror, which uses a videotape recorder as the storage medium. Today, they use twisted pair cable for the network, unlike all the others we tested. Still, it pumps 800,000 bits per second across the line and uses a collision detection scheme to keep everyone communicating. Just to be sure that we got the point, Corvus sent us 1,000 feet of twisted pair cable, four IBM interfacer boards, and a bunch of network connectors (or taps). Installing a Corvus network entails cutting and stripping the cable and

A comparison of load times for WordStar *when the networks are busy and are not busy.*



inserting the wires into the tap boxes. You then plug each PC into a tap box. Corvus' manual says they even supply a wire stripper, but we didn't receive one. The Corvus cable looked less substantial than the co-ax, but it was just as effective. The only drawback we were able to detect was radio frequency emission from the cable. It was weak but clearly detectable on our oscilloscope and could be heard in a radio if placed near the cable. The co-ax, of course, showed no such effect. If we were installing a Corvus network, we would prefer to use a more expensive shielded cable, despite the weakness of the radiation. The shields would have to be connected together in the tap boxes, but we think it would be worth the extra effort. Actually, though, it was pretty amazing to see this kind of performance over two rather ordinary pieces of wire.

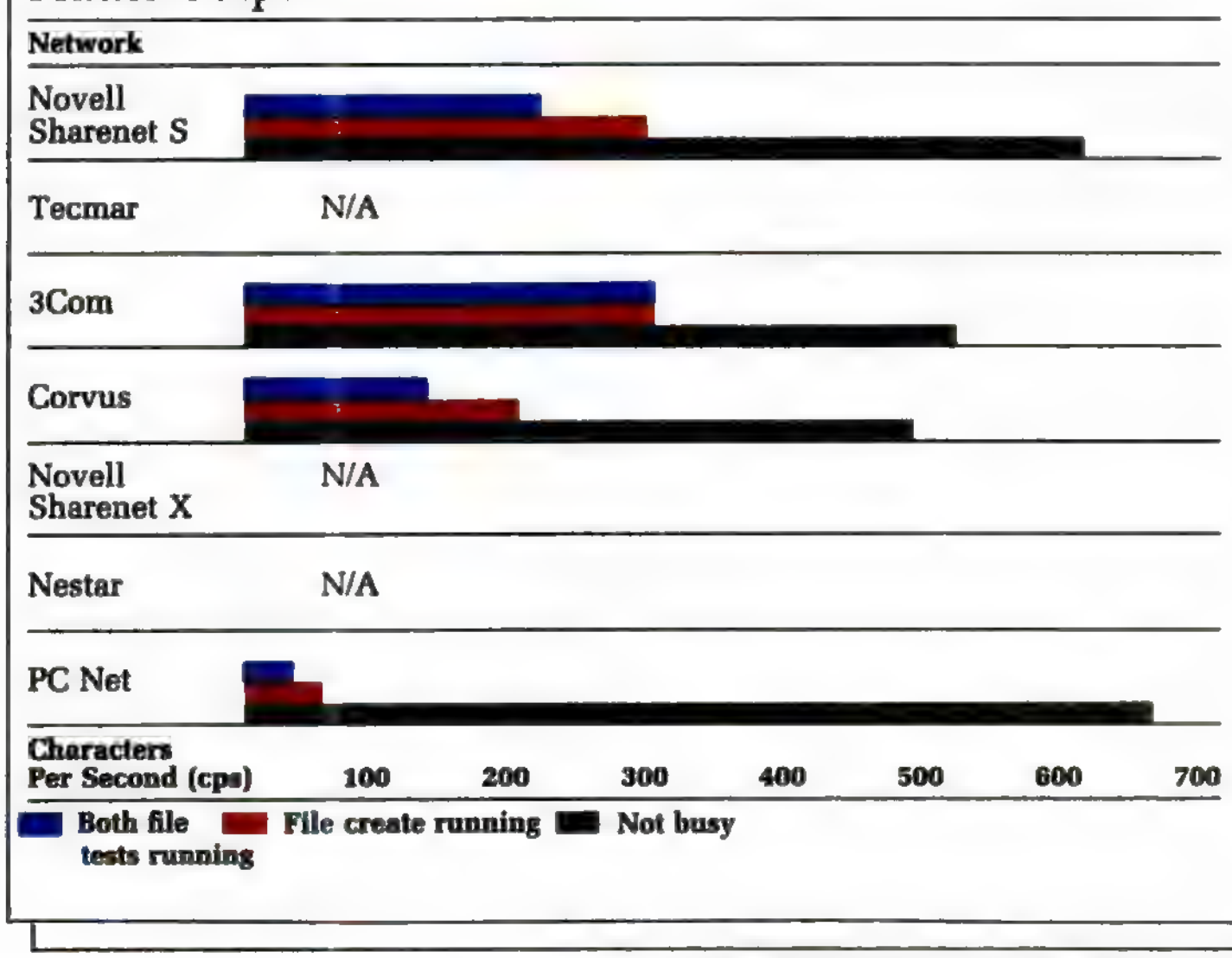
Corvus' file-locking technique is similar to PCnet's. There is a semaphore, or flag table, maintained by the file server, and the Corvus-modified BIOS consults it before opening files for read or write. You can set up a read/write permission scheme on a per-drive basis.

Corvus' spooling technique is a bit different from that of the other systems. There is a reserved spool area on disk and a utility program sets up "pipes" to steer printer output or files to the spool area. It stays there indefinitely, until you invoke the despooling program from one of the user PCs on the network. You can specify which queue or pipe to read from, and it is then redirected over the network to the printer on your PC. Alternatively, you can start the despooler and it will wait patiently for files to show up in the print pipe, printing them as they arrive. This makes a PC a dedicated print station, but you can easily interrupt the despooler at any point, use the PC for other tasks, and return it to printing when you are done. Individual PCs can, of course, print locally without spooling the output. An interesting feature of the spooler is that it uses compression techniques to reduce the size of the files in the spool pipe.

There is an optional electronic mail system produced by a third party vendor for use on the Corvus network. While we didn't have the chance to wring it out in our test, we understand that it is a competent package and will be the basis of PCnet's electronic mail system as well.

3COM'S software provides nifty page divider sheets separating one user's output from another.

A comparison of the speed of printer outputs (characters per second) when the networks are not busy, when they are creating a file and when they have both file tests running.



3Com EtherSeries

The only true Ethernet system in our test is 3Com's EtherSeries 3Com is the Ethernet company. Yes, Xerox has the name and the patents, but 3Com has all the big guys who developed it at Xerox. In addition to a host of products that cover Ethernet applications from mainframes down to pieces of cable, it offers PC-oriented systems in two flavors: one that uses a PC-XT as a dedicated file server and one that uses an Altos 586 as the server. We chose the latter for our test.

The Altos 586 taken by itself is an impressive machine. In its normal guise it is a five-user system with an 8086 running at 10 MHz, half a megabyte of memory, 10 or 30 megs of hard disk, Xenix operating system, and it's fast. 3Com's version is set up as a dedicated file and print server, with the Ethernet drivers, electronic mail, file system, and print spooler all running as tasks under Xenix. For file integrity and security reasons, no users other than the monitor terminal and the Ethernet tap are permitted on the 586. While the software

is capable of handling 100 users, the reasonable number is probably somewhere between 10 and 40, based on the mix of tasks. We tested the 10-megabyte version of the Altos. The 30-megabyte version's hard disk is about twice as fast. You wouldn't see all that much difference in maximum throughput, but the degradation curve would necessarily be lower in the server with the faster drive.

Having a system with real Ethernet rather than an Ethernet-like protocol has important implications. You can hook it up to anything that is supported by Ethernet communications. This means larger computers or entire computer networks, plotters, laser printers, word processors—the works. That's not to say that you plug in a piece of coax, and all is bliss. You still have to consider protocols, passwords, and compatibility, but the potential is there.

3Com's print server is different from the others. Print spooling and output are done from the file server, the Altos 586, in a minicomputer-like manner. It provides a serial port to drive the printer at rates up to 9600 baud. A potential drawback if you already have an investment in PC-compatible printers is that you can't hook them up to the file server, since they use a parallel interface. Your only recourse is to get a serial to parallel protocol converter.

The operation of the spooler, interface considerations aside, is quite good. Its overall speed drops slightly as the network becomes busy but stays about the same from that point on. It is similar in many ways to the performance of the Altos when running straight Xenix in multiuser mode. As you can see from the chart, the maximum speed we got over a 10-second interval was 540 characters per second; these actually are bursts at the full 9600-baud rate. That's more than enough to keep all but the fastest printers going full tilt. Ditto for the 320 cps throughput rate when the network was loaded. 3Com's software also provides nifty page divider sheets separating one user's output from another—very professional.

3Com is working with a number of software companies on products that will fit into the network environment better than the current crop. A database manager derived from *dBase II* is one, and the entire Visi-series is another. Developments such as these will move networks from being merely convenient to indispensable.

Novell ShareNet X

Novell, like 3Com, produces two PC-related network systems. One, ShareNet X, uses a PC-XT as a dedicated file server, with a network based on Ethernet. The other product, ShareNet S, uses a 68000-based dedicated file and print server in a star topology. Unlike Nestar's PLAN 4000, it uses a multiwire cable to exchange data with the user stations. We'll look at ShareNet X first.

In contrast to PCnet, ShareNet X completely occupies the file server PC-XT.

THERE are few operational differences between ShareNet S and ShareNet X.

The only functions you can execute on the host are network status and a few file server-oriented utility programs. At the time we tested ShareNet X, the print spooler was still under development. Therefore, our tests were limited to file server functions only. Like most of the others, Novell's systems require a modification to PC-DOS on the user stations. It intercepts only those calls having to do with disk drives defined as network drives and passes everything else through to your system.

ShareNet X boasts a 1.4 megabit per second data rate and uses some sophisticated buffering techniques on the XT for speed. For instance, *WordStar* takes an agreeably quick 1.8 seconds to load across the network. If you exit and load it again without having done anything else, it loads in only 1.2 seconds—with no disk accesses. It has been buffered in a memory cache on the host XT. We found that it would buffer up to 64K, resulting in some dramatic throughput gains for small or moderate-sized files. The disk caching, combined with a few other nifty techniques, was a clear indication that Novell knows its way around an operating system. Indeed, maybe it should have written DOS 2.0. The utility programs are UNIX-like, providing the gamut of user and file administration functions. ShareNet comes with a neat little programming tour de force called *Snipes*. It's a classic game in which your character can cruise through a maze, where it shoots a variety of objects and critters. The difference is that when two or more of you play it on the network, you're in the same maze. There you are, happily blasting everything in sight when another user's character glides into your maze and blows you to smithereens. The network version of *Snipes* runs on monochrome monitors and, in addition to being fun, is indicative of the way data can be shared among multiple stations, given the right programming.

There is an optional electronic mail subsystem, which provides the usual message storage for users and has an "urgent" feature that alerts a user to important messages. Quite a bit of attention has been given to security provisions on ShareNet, steering users to certain drives, directories, and files. As with UNIX, a user may belong to a group and have all the privileges of the group automatically, while maintaining private files that the rest of the group does not have access to.

Novell's system monitor, the visible portion of the program that operates on the file server XT, is well thought-out. It shows the activity of up to six PCs and gives continuous information on network activity and the number of disk I/Os pending. While some of the information might be described as a little "gee whiz," it certainly keeps you informed.

ShareNet appears to be as strong a foundation as any, given the number of

extensions to DOS that can be called by a programmer writing application programs. It permits the full range of multiuser functions, including file and record locking, security levels, and hierarchical directory navigation.

Novell ShareNet S

For networks that look so different physically, there are few operational differences between ShareNet S and ShareNet X. Like PLAN 4000, ShareNet S uses a 68000 to run the file system. Unlike PLAN 4000, there is also a Texas Instruments 16-bit microcomputer chip for every two users hooked up to the network. It provides sufficient intelligence that communications can be overlapped among stations, raising the overall effective speed beyond the nominal 500,000 bits per second on each line. Remember, ShareNet S is a star configuration, with a direct line running from every device on the network to the server. All user-to-user communications go through the server. You can increase the capacity of a ShareNet S server in increments of six users at a time to a maximum of 24. It uses a terminal, like 3Com and Nestar.

As you can see from the charts, the per-

Definitions for Networks

An explanation of networking terms that appear in the article.

When we say network, we are referring to a generic means of hooking machines together. There are two major types of networks: collision-detecting and token-passing. The former is the idea on which Ethernet is based; that is, each machine on the network has an "address" or code to which it responds. Any machine can send a message (of standard length and format) to any other machine on the network. The recipient of the message replies with an acknowledgment to let the sender know that the message got through okay. If two devices attempt to transmit at the same time, a collision will result, forcing each device to retransmit. Each board pauses a brief, random amount of time before retransmitting, minimizing the chance of another collision. Each board listens for a carrier signal before transmitting, indicating that no other user is on the network, avoiding unnecessary collisions and retransmissions. Since the speed of the network is usually a million bits per second or higher, collisions are not a big consideration in network performance. Even on busy Ethernet systems, it's unusual to have more than a few collisions a day. The formal name for this routine is CSMA/CD, for Carrier-Sense Multiple Access/Collision Detection.

Token-passing networks are based on a device or central computer that supervises the network, giving each device permission to send information. There are no collisions, since no two devices can transmit at the same time. Token-passing network supervisors usually are capable of balancing the load on the network by telling a very busy sender, "Shut up for a while and let somebody else talk." Neither type of network is limited by the speed at which it can transmit characters, but a megabit (one million bits per second) is typical, and 10 megabits is the maximum you're likely to see. The Ethernet standard covers networks with a speed of 1 to 20 megabits per second.

A *network user* is a station that uses the resources of the network. An example is a PC with only a floppy disk and no printer. A *network server* is a device or station that provides resources to the network. There are two kinds of servers, dedicated and shared. A dedicated server may be a PC-XT, which is unusable except by the network. Some vendors provide non-PC computers as dedicated servers. Shared servers also may be used as computers, even though their resources are shared by other machines on the network.

A *file print server* provides only hard disk to the network. It may be dedicated or shared.

A *print server* is a station that provides printing facilities to the network. It is shared, by definition, and may be part of the file server.

Print spooling is special software that coordinates and controls printing on the system. It stores characters headed for the printer, on disk or in memory, much faster than the printer could actually accept them, releasing network users far faster than if they had to wait for the printer. The software then directs the characters to the printer or holds it to be *despooled* by a user.

You'll see the word *node* just about everywhere but here. It means any station on the network, whether it is a user, server, printer, or what have you. Its vagueness makes it useless.

Topology is another good networking word, a favorite of uninformed salesmen. It describes the way in which all the devices on a network hook up to one another. Most of the networks you will encounter are based on *bus* or *star* topology. Bus networks are simply a transmission medium (coaxial cable, fiber-optic cable, or twisted-pair cable) that runs from one device to the next, in no particular order. Star networks have a separate line running from every device on the network to a network controller or file server.

—*B.M.*

formance of ShareNet S was slightly worse than ShareNet X for tasks that did not stress the file server heavily. There were strong indications, though, that an XT-based network would be hopelessly bogged down in work that the 68000-based server would take in stride. Once again, the degradation curve becomes important as network loading increases.

Operation of the network from the file server is similar to ShareNet X, except that there are additional commands to handle the print spooler. In operation it is similar to 3Com's, except for additional features such as changing the priority or order in which spooled documents will be printed. From the user's point of view, there is no difference between ShareNet X and ShareNet S. An interesting feature of the ShareNet S interface boards is that they contain a bootstrap program in read-only memory. PCs without any disk drives can thus use the system as intelligent terminals.

Tecmar

Yes, Tecmar has a network, too, and you've been hearing about it for months. At press time, it was just coming out of the lab. Tecmar uses 3Com's communication boards, but shares little else with the 3Com system. Instead of concentrating on the minicomputer-like functions exemplified by most of the other networks in this article, Tecmar chose to exploit other capabilities of Ethernet and some of their other technologies. Basically it has combined voice and data on the same network and integrated it with telephone control hardware and software. The result is a unique communication system, one that nearly defies classification.

The big news with the Tecmar system is that not only can you send voice communications over the Ethernet cable, but you can digitize it, store it, and play it back. At the most trivial level, this means that you can make a PC into the world's most expensive phone answering machine. At the other end of the scale, it is the foundation for a sophisticated phone and communication management system. You can record a voice message on disk (4,000 bytes per second of speech) and send it to one other person or an entire distribution list. It can play prerecorded messages and record responses for later playback. The digitized sounds can be analyzed or processed to modify the sound. Mostly, though, you'll just want to retrieve them and play them back over a speaker or telephone. The design criterion was for speech quality that sounded as good as normal telephone conversation, and Tecmar has achieved that end. The Ethernet companion board, as it is called, permits attachment of a tape recorder, footswitch, and a few other goodies, in addition to the telephone. Indeed, it can become your telephone, with only the handset plugged into the companion board. The software will dial, record phone usage, time calls, and figure out charges. The voice messaging system is truly a store-and-forward design, as the messages can be moved easily among PCs in the network.

THE TECMAR system is the foundation for a sophisticated phone and communication management system.

In terms of more traditional networking activities, we caught Tecmar a little early in the design cycle. The software we tested was capable of moving data from one machine to another, but full file-and print-server subsystems were still in beta test. We were, however, able to simulate our file read and file creation benchmarks on the network to test its speed. It proved to be fast, executing the file create test in 23 seconds, while the phone management software was operational (but not busy) in the host PC. While we look forward to wringing out a full-blown data and voice network from Tecmar, the data portion has taken a back seat to voice. While it appears that their system will have the same functionality as everyone else's, we will have to wait and see. Tecmar's use of the 3Com board would seem to guarantee full compatibility with Ethernet—a potential advantage.

In this new, nontraditional network application, voice messaging, Tecmar may very well have a tiger by the tail. We've used some mainframe-based voice messaging systems, and Tecmar's appears to be every bit as flexible—more so, if you have or will have an in-house PC network.

Documentation

There was great disparity in the quality and amount of documentation available with networks. 3Com's was the best, and, while there wasn't a "worst," PCnet's documentation could have been more detailed and better developed. For instance, in order to use the low-level file-locking protocols available from PCnet's BIOS, you have to request the documentation for that feature from AST or Orchid. There were minor differences in the AST and Orchid versions of the documentation, with the nod for quality going to AST. Only two of the vendors' manuals discussed interrupts and the potential for conflict, and only one of the two gave any suggestions on what you could do about conflicts.

Corvus' documentation, while brief, covered what needed to be said and did it succinctly. It actually went into a fair bit of detail on things like dealing with media defects, programming with semaphores, and even configuration for proper operation with programs like *Visicalc* and those from the Peachtree accounting series.

We mentioned Nestar's two thick volumes. If they had been typeset instead of typewritten, they would be two moderate volumes or one thick volume. The appearance of the Nestar documentation is not up to the level of professionalism so evident in its product. The contents, however, are just fine. The documentation is nicely broken down into user-oriented and system manager-oriented chapters.

Part of the ponderousness is due to the inclusion of the non-IBM operating system options as well as PC-DOS. There's a fair bit that could be eliminated from this manual for a PC-only network.

Novell's manual is typewritten in a large three-ring binder. It covers everything from physical installation of the system to use of the extended DOS calls for multiuser operation. We were able to review a proof copy of new documentation on the way to the typesetter. It looked even better than the original—more tutorial and detailed.

We said that 3Com's documentation was the best, and it is. It covers all that you need to know about installing and using the product, including some how-not-to's and what to do about it if you've done it wrong. The manual is typeset and index tabbed, with good illustrations where appropriate, something that most of the others lacked. Corvus had the only other manual with effective illustrations.

Conclusions

Throughout this article, you've read the words *new, developmental, beta test, coming soon,* and *under development.* Our purpose was to separate the smoke from the fire, and there is no doubt that there is a bit of each in networking. You've seen what we've seen—everything from promises to products. Several manufacturers wanted a full mention in this article based on specifications of forthcoming products, anywhere from 2 weeks to 4 months away from introduction. Sorry, guys. Reality was required to make the team. We grant you that this market will be considerably more mature 6 months from now, but one thing will remain the same: it will be divided between those companies that have their acts together and those who don't. We were frankly surprised that the market is as good as it is, this early in the game.

THE appearance of the Nestar documentation is not up to the level of professionalism so evident in its product.

We didn't really have to call for help in installing any of the systems, but then we're not neophyte PC users. Based on the overall level of documentation, we recommend that if you're interested in networks that you pursue them through a dealer. Indeed, most of these products are available only through dealers. That's to your advantage; you have someone to hang it on when it doesn't work the first time.

Performance numbers: how much do they really matter? One of the networks we tested was clearly the fastest, another undeniably the slowest. Did that make one the winner and the other the loser? We called some users of PCnet, the slowest in our test, to find out if performance was a problem.

None cited speed limitations as an

Network	Type	Dedicated File Server?	Terminal Required?	Print Spooler?	Printer Type	Other (Non PC) Operating Systems?	Security 1-Poor 5-Excellent	Ease of Installation 1-Difficult 5-Easy	Cost: Board / Server
PC Net	CSMA/CD	No	No	Yes	Par.	No	2	2	$695 / N/A
Sharenet X	CSMA/CD	Yes (XT)	No	No	—	No	4	3	$595 / $4995 (XT)
Sharenet S	Token	Yes	Yes	Yes	Ser.	No	4	3	$250 / $8785 (20MB)
Nestar	Token	Yes	Yes	No	—	Yes	4	4	$595 / $19,995 (60 MB)
Tecmar	CSMA/CD	No	No	No	—	No	N/A	3	$1645 (Voice) $950 / $4995(XT)
3 Com	CSMA/CD	Yes	Yes	Yes	Ser.	No	5	4	$950 / $12,500 (30 MB)
Corvus	CSMA/CD	Yes	No	Yes	Par.	Yes	2	2	$495 / $3985

MB-megabytes

Considering Cost Effectiveness

When it comes to networks, the price tag depends on more than the cost per work station.

You've decided to buy a network, and you've read all about each system's capabilities and limits. Now you want the bottom line: the best network for your money. For all the networks, cost-per-user levels off at about nine work stations. The seven networks divide into two basic price ranges. Keep in mind that our prices are rough figures and do not include the cost of wire and some utility software.

The lower-priced networks include PCnet, Corvus, and Novell's Sharenet X and S. Obviously, PCnet is the least expensive network, provided you can live with the system's limitations. Although Novell's Sharenet X and Sharenet S basically performed equally, you must remember that the X system is limited to six users. If you have more work stations, the Sharenet S network is better in terms of price and capability. However, the Sharenet X price includes a PC-XT for a server. The Corvus is cheaper than either Sharenet system and has the extra advantage of accommodating different microcomputers, such as the IBM PC and Apple. The only other network that offers such flexibility between microcomputers is Nestar, the most expensive system we tested. Corvus uses twisted pair cable, which is about one-fifth the price of coax.

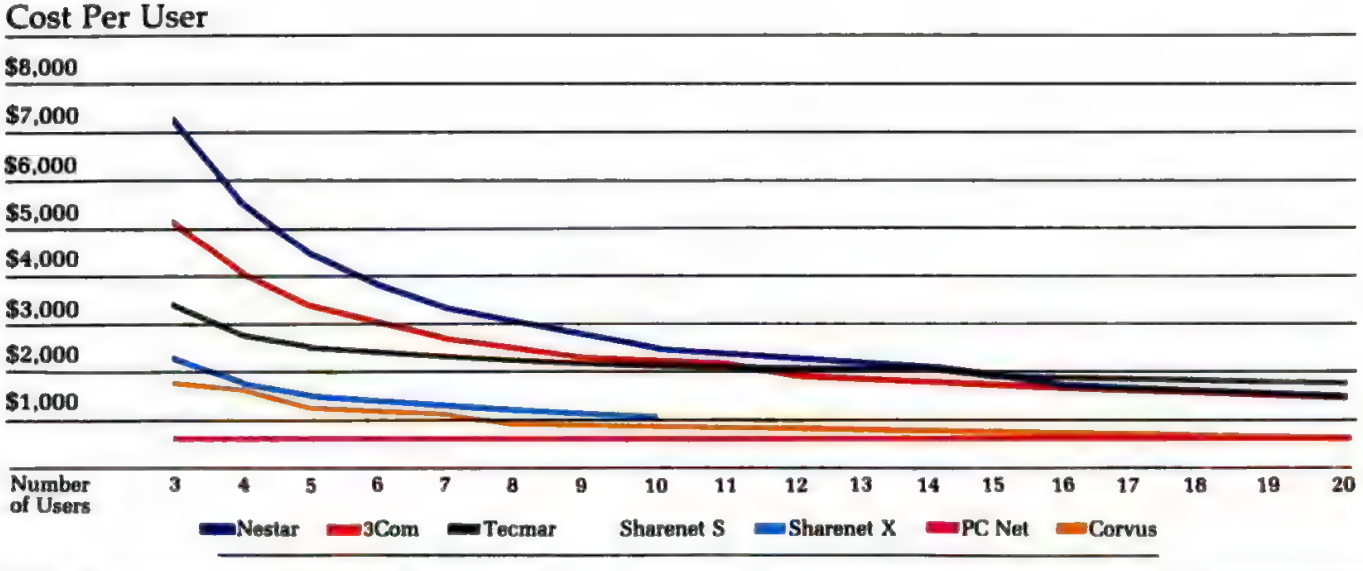
Nestar, along with Tecmar and 3Com, are in the higher price range. Nestar remains the most expensive network. However, it includes the largest disk and a tape backup and the price becomes competitive when there are 13 or more users on the system.

The price from 3 to 20 users does not vary much for the Tecmar network. The big advantage of the Tecmar system is its capability for voice digitization. Further, the Ethernet companion board for this function is included with each machine. The price quoted in the chart for the Tecmar system also includes an XT server (not dedicated), since we can't imagine using this network without a hard disk. You may prefer Tecmar's expansion chassis and hard disk as an alternative.

The 3Com EtherSeries, which is priced between the Nestar and Tecmar, has several advantages that justify its price. It is the only true Ethernet system, which makes it compatible with many other Ethernet products. The system also has great flexibility, because it is fast and can accommodate many users. The system also has numerous powerful utility programs.

The advantages and disadvantages of each network must be weighed against price. The bottom line is that the least expensive system may not be the one for you.

—Lisa Ellen



obstacle. One user, who was using *dBase II* across the network (although not in multiuser mode) liked the ease with which it could be accessed from any terminal. She had set up the recommended batch files to lock data files in use, and while the process was a little unwieldy, she found it effective. Most users liked the low cost of PCnet and because of it, were willing to live with its other shortcomings. One user cited difficulty of installation, mentioning conflicts with other boards in the system using the same interrupt.

We found this to be a problem with network boards as a whole, not just with PCnet's. There are precious few interrupt lines available on the PC, and there is no agreement on which manufacturers or functions will use what line. Expect some problems if you have various multifunction boards in your PCs. Expect more problems if you have the older, 64K system board. Oh, you'll get it to work, but you may wind up disabling COM2: or some such thing on the system. Another problem that surprised us was the poor quality of coaxial terminations on all but the 3Com cables. After experiencing some flaky behavior, we hooked random pieces of co-ax, supplied by the manufacturers, to the oscilloscope and a signal source. We found lousy, attenuated cables, bad joints, and general junk. Overall, the quality was bad enough that we couldn't single any manufacturer out as a culprit. Maybe these cables have been to a lot of shows and have been abused, but we didn't expect them to be this bad. In any case, they are something for you to look out for if you find yourself in the market.

We were glad to hear that 3Com is supporting the efforts of software houses to produce network-compatible products, such as database managers and spreadsheet programs. Doubtless, other network vendors will follow suit. We fear, however, that such efforts are doomed to repetition, if not to failure. MS-DOS is not a multi-user operating system. Each network vendor adds his own extensions to it, and the software authors must conform to these extensions. Perhaps the next release of DOS will have multiuser extensions that remove the dependencies on nonstandard DOS calls. Maybe there even will be a standard way to recognize and integrate calls to a nonlocal resource, such as Digital Research's CP-Net or some of the distributed processing schemes found on minicomputers. Until then, distributed databases will be unlikely, and you may have to buy your database manager and other software from the network vendor or his dealer if you want full utility.

There are large disparities in the effectiveness of security provisions on the various networks. Some, like PCnet, are strictly for people who like each other and understand the way things work. Corvus' protection scheme is in the same league, maybe half a step up. The big boys in file protection—Nestar, 3Com, and Novell—are all very minicomputer-like, with security provisions that most resemble VAX VMS or UNIX. The system administrator has complete control over group and user permissions, use of system facilities, and the like. Users are adequately protected from one another and from themselves. These high-end systems, especially 3Com and Novell, also have the best print-spooling facilities, if use of a serial printer isn't a drawback. (See the chart for a complete listing of usable printer types.)

Our purpose was to separate the smoke from the fire, and there is no doubt that there is a bit of each in networking.

Overall, our tests were very enjoyable. It was a real pleasure to use most of these networks. As we said before, they were, overall, surprisingly good. Oh, we have our complaints, but they're mostly the result of immaturity in the marketplace. We anticipate, though, that the good ones will get better and that there will be some quick-and-dirty entries in the market, whose only claim will be low price. Our advice: Assess your needs carefully, make your choices, and don't be afraid to pay for the capabilities you need. */PC*

Editor's note: *See also "Getting hooked on PCnet," and "Getting the Net Working," in this issue.*

Product Information

For list prices of the products, see chart.

Omninet
Corvus Systems, Inc.
2029 O'Toole Ave.
San Jose, CA 95131
(408) 946-7700

CIRCLE 548 ON READER SERVICE CARD

Plan 4000
Nestar Systems, Inc.
2582 East Bayshore Rd.
Palo Alto, CA 94303
(415) 493-2233

CIRCLE 547 ON READER SERVICE CARD

EtherSeries
3Com Corporation
1390 Shorebird Way
P.O. Box 7390
Mountain View, CA 94039
(415) 961-9602

CIRCLE 546 ON READER SERVICE CARD

Elan
Tecmar, Inc.
6225 Cochran Rd.
Solon, OH 44139
(216) 349-0600

CIRCLE 545 ON READER SERVICE CARD

Sharenet X and S
Novell, Inc.
1170 North Industrial Park Dr.
Orem, UT 84057
(801) 226-8202

CIRCLE 543 ON READER SERVICE CARD

PCnet
Orchid Technology
47790 Westinghouse Dr.
Fremont, CA 94539
(415) 490-8586

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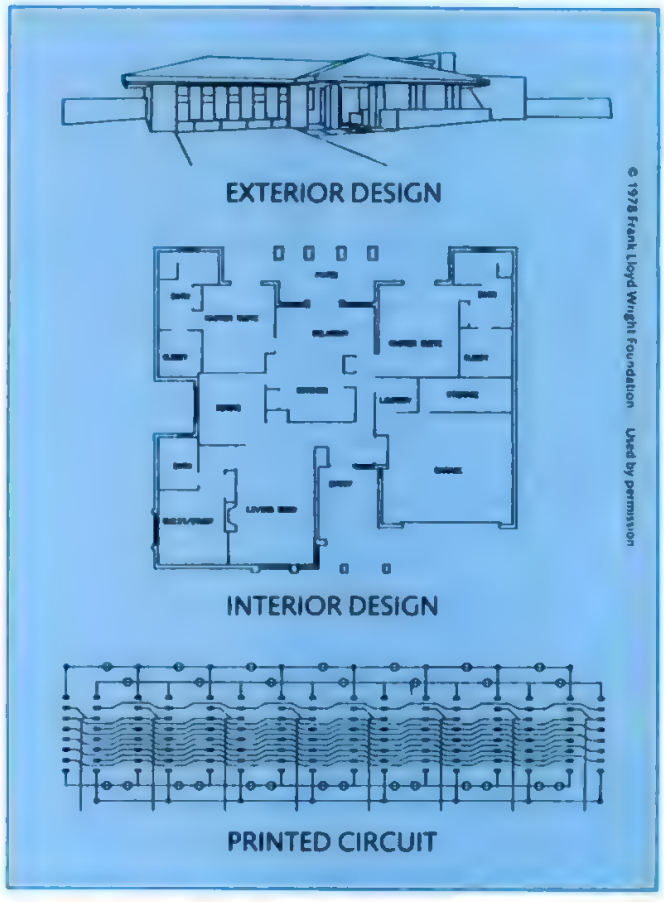
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*Minimum Configuration Requirements for IBM PC
(note that there is a choice of three differing versions)
PC-DOS Operating System version 1.1
128K memory
RS-232 serial port IBM compatible at standard address

1-IBM dual screen version-monochrome display adapter with monitor
-color/graphics display adapter with monitor
2-Vectrix version-Vectrix VX384 on parallel port
-monochrome display adapter with monitor
(on the IBM and Vectrix versions above two monitors are required)
3-Hercules version-Hercules graphics board
-IBM monochrome display adapter with monitor

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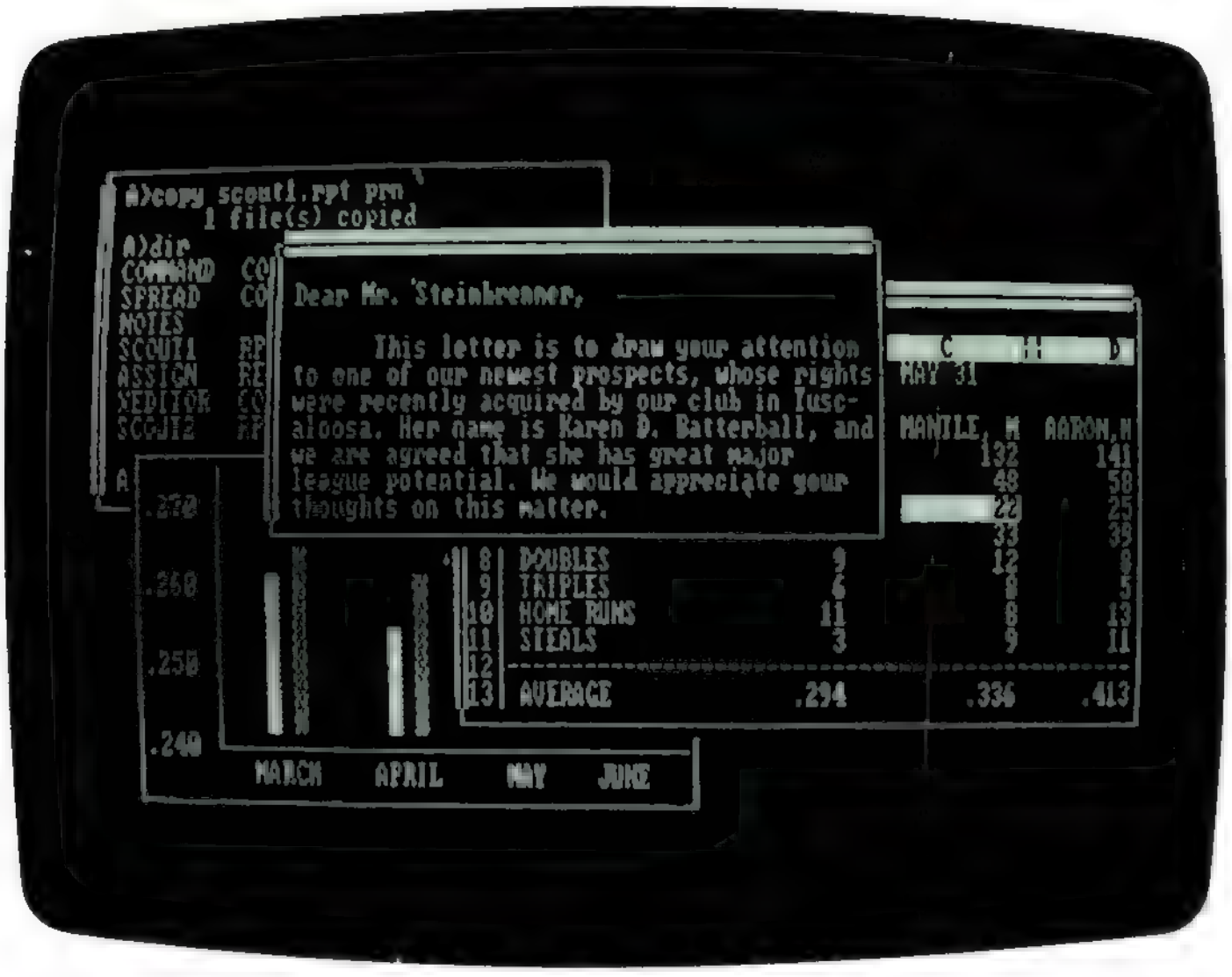
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(415) 490-8586
List Price: $1,490, includes 2 adapter cards, 20-foot cable, and software

CIRCLE 553 ON READER SERVICE CARD

PCnet is a low-cost local area network (LAN) developed by Orchid Technology. (It is also available through AST and Santa Clara Systems; see "Battle of the Network Stars," in this issue.) PCnet lets IBM PCs, and PC compatibles such as Eagle, Columbia, Compaq, and Corona, share hard disks and printers. Before we look at the technical details of PCnet, let's look at just what a local network is, and why you might want to consider purchasing one.

Defining a LAN

A local network connects two or more computers and enables them to share data, programs, and hardware. It makes sense to use a network to share expensive hardware such as hard disks, color plotters, or letter-quality printers. However, it usually does not make sense to share inexpensive hardware such as floppy disks or dot-matrix printers.

COMPUTERS connected by a local network are usually fairly close together geographically.

Sharing data is the most compelling reason to consider a local network. One advantage of sharing data with a local network is that everyone on the network has access to the most recent version of the data. The simplest, cheapest alternative to using a local network to share data is to make several copies of the file on floppy disks and give each user a copy. But there are drawbacks to that simple solution. Many data files are too large to fit on one or two floppy disks and need the space of the Winchester disk, which allows much faster access than the floppy disks.

For many applications, a more pressing problem with sharing data files via floppy disks is that it probably is not practical for keeping the copies of the file absolutely current. Naturally, for seldom-changed files, this isn't much of a problem. But for frequently updated files, having some users looking at out-of-date versions of the files can often cause real difficulties.

Computers connected by a local network are usually fairly close together geographically. Many local networks serve a single building, although it's not uncommon to have several buildings served by a single local network, such as a local network for a university campus.

Local networks can be classified by the pattern you would see if you drew a diagram of the location of all the computers connected to the net. This pattern is called the "topology" of the network. In a star network, each computer is connected to a central computer, much like the spokes on a bicycle wheel are attached to the hub. A

ring network topology connects each computer to two other computers, forming a ring. A bus arrangement connects all the computers to a common wire, but, unlike the ring, the two ends of the network are not connected together. All three ways of arranging local networks are useful, and commercial and research networks have been designed that use one or another of the three network patterns. Currently, the bus network topology is the most common, and the ring arrangement is probably least common.

PCnet Parameters

PCnet uses a bus topology. So, all computers using PCnet are attached to a cable that runs in a single line throughout the local network area. The cable is the standard 75-ohm coaxial cable used to connect your TV to cable services such as HBO or MTV. This RG59B/U cable is fairly flexible and light and can be used for networks of up to 3,000 feet. It currently costs about 30 cents per foot. The heavier RG11/U cable, which costs about twice as much as the RG59, is used for more extensive networks of up to 7,000 feet. Good news for do-it-yourselfers: you can buy the tools and connectors needed to construct cables for PCnet at many electronics stores.

PCnet is a baseband network that uses carrier-sense multiple access with collision detection (CSMA/CD) as the method of sharing the local network channel.

For this review, I used PCnet Version 2.0 with PC-DOS Version 1.1. PCnet is currently available for either DOS 1.1 or DOS 2.0. However, PCnet does not support networks where some machines run DOS 1.1 and others use DOS 2.0, since there are incompatibilities in the two file systems. (If you use DOS 1.1 to write on a DOS 2.0 disk, you will ruin the disk.)

A RING network topology connects each computer to two other computers, forming a ring.

I tested PCnet using only two PCs. Although most PCnet installations will have far more PCs on the net, I tested it with two PCs because that's all I could easily get my hands on. For most of my testing, a greater number of PCs on the network wouldn't have made any significant difference. For this review, one PC was configured with a Tallgrass Technologies 12-megabyte hard disk, the other with only floppy disks. Both PCs had 320K of memory, and so I was able to use RAM disks with the network.

The Tallgrass model 12+12 has a 12MB hard disk and a 12MB cartridge tape for backup. PCnet supports almost all of the hard disks that are available for the PC. In addition to the PC-XT, it handles Santa Clara Systems, Tallgrass, Tecmar, Microcode, QCS, Datamac, Davong, and Corvus. Since I haven't tried any of the other supported systems, all I can report is that PCnet works fine with the Tallgrass system.

PCnet costs about $750 per computer connected to the network. Its greatest strength is that it lets users share a standard PC-XT or other hard disk. But the crucial feature is that the so-called "server PC," which shares its disk with other "user PCs," does not have to be dedicated to that task. A user can sit at the XT and use it normally, while the XT disk also is shared by other PCs on the network. Naturally, if one or more of the other users on the net were doing lots of disk input/output the person using the XT would notice some degradation in response time. But what makes PCnet and other local networks practical is that it is unlikely that everyone will use the net at the same time. Research has shown that local network traffic is very "bursty"; that is, there are long lulls when nobody uses the net interspersed with occasional short "bursts" of heavy activity. Due to the intermittent nature of network activity, PCnet allows a regular user to work at the keyboard of the shared PC with minimal diminution of effectiveness.

PCnet lets users share a central hard disk, such as a PC-XT. What sets PCnet apart from most of the other networks for the PC is that the PC, with the hard disk, is not dedicated strictly to network use. For smaller networks, this significantly reduces the initial investment needed for installment.

Most other local networks require a dedicated hard disk. The 3Com Ethernet system allows an XT to be used as the file server, but the XT must be dedicated to that task and can't be used locally. The Corvus OmniNet system requires a dedicated Corvus disk as the file server. Nestar's Plan 4000 and Novell Data System's ShareNet also use dedicated file-server machines; they cost quite a bit more than PCnet for a minimum configuration.

PCnet also lets user PCs run programs on a server PC. This "remote execution" feature may be useful in some situations, but it seems much less advantageous than the disk sharing provided by PCnet. The server PC is given priority, and, when a user PC submits a program to be executed, the remotely submitted job is queued until commands typed from the server keyboard have been completed. When the server PC is ready, a short beep is sent to the user PC. I didn't spend much time testing this feature. With some clever custom programs, I can imagine that it might be useful. But I doubt that many PCnet users take advantage of this feature.

PCNET DOES not support networks where some machines run DOS 1.1 and others use DOS 2.0.

A simple program to allow shared use of a printer attached to a server PC is also provided with PCnet. It works, and it is fine if the printer is seldom used. But in Version 2.0, the support of the printer is quite limited. When several people need to share a printer, what you really want the "printer server" to do is accept material for printing, even if the printer is busy at the time. The data that needs to be printed would be stored temporarily on disk and the print request entered in a "list of things to do" so that the server can start printing the next job as soon as the current one is completed. Since the PCnet printer server does not support these more advanced features, if the printer is busy, you'll just have to wait and ask again later. Again, this restriction will not affect all PCnet applications.

Installation Specs

PCnet is easy to install once you figure out the documentation. At the time I wrote this review, the Version 2.0 PCnet *User's Manual* was marked "preliminary." It was. The 18-page manual included some sections that were clear and easy to understand, but other sections certainly were not. In fact, once I got everything working, my overall evaluation was that PCnet's one weakness was its inadequate documentation.

The PCnet hardware is easy to configure. First, you assign a unique "network identification number" to each work station that will be on the net. It's easy if you understand hexadecimal numbers and have had a little experience setting DIP switches. I had little trouble getting the switches right the first time, but since I had done this sort of thing a few dozen times before, I was able to read between the lines of the manual. If Orchid would include a simple BASIC program on the software distribution disk, the user could ignore hex altogether by typing the desired board address in decimal, and then copying a DIP-switch pattern generated by the program.

Once the board ID number has been set, the network board is plugged into any slot of the PC. It is a full-length card, and Orchid thoughtfully provides a plastic board-support to snap into the front of your PC. Initially, the process of getting switches set and boards installed takes about 10 to 15 minutes per PC. Once the process is clear, it takes only 5 minutes per machine.

PCNET REQUIRES that all machines attached to the network be designated as "shared PCs" or "user PCs."

After the PCnet board is installed, cable is run between the network computers. Hooking cable between computers on the network is simple, as long as you have the correct cable and connectors. I used cable supplied by Orchid Technology that already had the correct BNC "T" connectors installed. Assembled cable for PCnet is inexpensive: Orchid charges $20 for 20 feet, $29 for 50 feet, and $50 for 100 feet of cable, including the required BNC connectors.

For small PCnet configurations, I think that purchasing the cable when you buy the network is desirable. For larger networks, or in situations where you have to move machines and reconfigure the network now and then, you may want to buy a tool (for about $200) to fabricate your own cables.

The challenging part of installing PCnet comes after the adapter boards are configured and the cables are connected. I had trouble getting my system up and running, but my problem is not a fair indication of what an average user would face, since it turned out that the problem was not with the PCnet software. It was due, instead, to an incompatibility between PCnet and the Seattle Computer Products *Flash Disk* software. (After I finally discovered the source of the problem, I was able to use the AST SuperDrive memory disk software in conjunction with PCnet with no problems.) I doubt that this problem would have arisen with DOS 2.0, since installable device drivers are now used by all memory-disk vendors. The reason that I think there no longer would be any conflicts is that with installable device drivers, everyone follows the same rules, as defined by IBM. Before DOS 2.0, it was every vendor for himself, with lots of room for incompatible modifications to DOS.

Servers, Sharers, and Users

PCnet requires that all machines attached to the network be designated as "shared PCs" or "user PCs." The distinction is straightforward: a shared PC (sPC) has resources that are shared with other work stations on the net. A user PC (uPC) does not share any of its resources with other PCs on the network, but it may use the resources of one or more sPC machines.

PCnet creates the illusion that remote, shared disk drives are attached to a user PC. After a network is configured, a user has one or more additional drives that are available on the network. For example, a user PC with two floppy disk drives (drives A and B under PC-DOS) might also have a drive C that is all or part of a Winchester hard disk on a server PC. Once the system has been booted, the user actually can "log on" to drive C. All of the standard PC-DOS utilities, such as COPY or CHKDSK, work on network drives exactly the same as they do on local drives.

ALL OF THE standard PC-DOS utilities work on network drives exactly the same as they do on local drives.

There are fancier ways to implement networking, but I found the PCnet disk-emulation approach easy to learn and use. When the shared disk is a Winchester or a RAM (memory) disk, the average access time is so fast that most users will not know that the disk isn't local. Obviously, if there are 25 PCs all on one network, and they all decide to back up their files at the same time, there will be noticeable delays. But most of the time, local networks are idle, so the chances are quite good that when a given user wants to copy a file from a shared disk, nobody else will be using the network at that instant.

When a given shared PC is configured for the network, you are able to decide on an individual basis which user PCs will be given access to the various real disks on the server PC. For example, I had formatted the Tallgrass hard disk as four logical disks of 3 megabytes each. (This makes backup with the 3M cartridge tape easy, since each of the four tracks of the tape stores 3 megabytes of data.) When I installed the Orchid Technology network software for the server PC, I decided to let the user PC have access to only two of the four Tallgrass logical disks. This meant that when someone was using the server PC, there was no conflict between the user PC and the server for the nonshared logical drives.

In Version 2.0 of the PCnet software that I tested, each drive on the server PC was given a meaningful name. However, due to the disk-emulation approach used

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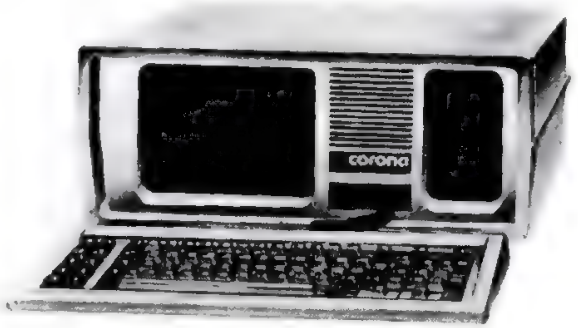
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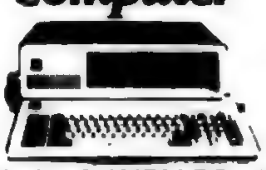
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CIRCLE 162 ON READER SERVICE CARD

to share disks, these meaningful names were never used. Instead, from the user PC, shared drives were known as drives C or D or whatever, using the standard PC-DOS conventions. I didn't have a big problem with the drive names, although it was confusing due to the manner of mapping the drive names on PCnet. If a user PC has one drive installed, the first shared drive will be called drive B. Never mind that this shared drive B is really drive E or whatever on the shared PC. I became confused trying to remember that B really meant E when using files from the shared PC. In many cases this might not present a problem, since a person might use only one machine or the other, but not both. I think most users will adapt quickly to the drive names used by PCnet, as long as they don't have to move from one PC to another frequently. (Going to another user PC can be especially confusing, since it may have a different set of drives that it's authorized to use.)

One restriction of PCnet that might be important in some applications is that one shared PC can not access files from another shared PC. I think that most PCnet installations will have only one shared PC, so this restriction wouldn't apply. However, in those cases where there are multiple shared PCs, it is unfortunate that one shared PC has no convenient way to send a file to another shared PC. (There is one inconvenient way: a user PC with access to both shared PCs can copy a file from one to the other.)

SINCE THE ERASE command knows nothing about file locks, it will obediently go ahead and blow the file away.

File-Locking Problems

One limitation of PCnet is the way it implements file locking. When more than one user has access to a single disk, precautions must be taken to guarantee that only one person is able to access a given file at the same time.

The correct way to enforce this important restriction is to have the operating system (PC-DOS) perform the file-locking service. But PC-DOS was designed as a single-user operating system in which the file-locking problem doesn't exist, since only one person can use the system at one time. PCnet provides a layer on top of DOS that attempts to provide a file-locking service, using so-called "named locks." Any user PC can request that a lock be set or reset for a given file on a server PC. When this is done, the PCnet software makes a note that the locked file is in use. Any program that knows enough to check with PCnet and ask if the file is locked before using it will work correctly.

In a more recent version of PCnet (2.0b), Orchid Technology has added another protection that reduces the problems that can occur when multiple users are authorized to share the same disk. When a user opens a file for writing, Version 2.0b automatically locks the File Allocation Table (FAT) that PC-DOS uses to manage the allocation of disk space. Since I didn't use this feature, I don't know how well it works.

If everyone is living by the same rules, all is well with PCnet. This will be true for a system of application programs, all written with the PCnet form of file locking in mind. Right now, a special version of the DataFlex database package is available that takes advantage of PCnet. According to Orchid Technology, a PCnet version of *dBase-II* will also be available in the near future.

But as soon as someone ignores the PCnet file-locking rules, problems can occur. For example, all of the standard DOS utilities and commands do not observe the named file-locking service provided by PCnet. This means that a user PC could request a lock on a file and think that all is well. In the meantime, another user with access to that disk might choose to erase the file. Since the ERASE command knows nothing about file locks, it will obediently go ahead and blow the file away. The program on the user PC would think all was well, accept commands to update a record, and unlock the file.

The best solution to the file-locking problem would be for Microsoft and IBM to recognize the importance of networking and offer an improved DOS that would provide the needed features. Another alternative would require Orchid Technology to build a more comprehensive layer on top of PC-DOS. Since that's another way of saying "write an operating system," I doubt that it is practical for the market niche that PCnet serves. There are lots of applications where the users are not hostile to one another and where the protection offered by PCnet is adequate. However, there are many other applications where the PCnet approach to file locking doesn't provide adequate protection.

AS A USER, all I care about is how long it takes to get a certain amount of data from one machine to another.

Speed Testing

PCnet transmits data at about 880,000 bits per second, using the Intel 8274 multi-protocol serial controller. (Orchid's product literature and advertisements round this figure up to 1 megabit per second.) The Corvus OmniNet network uses about the same data rate as PCnet. Plan 4000 from Nestar runs at 2.5 megabits per second, while 3Com's Ethernet for the PC has a 10-megabit per second data rate.

Your real question is probably "Is PCnet fast enough to do what I want to do?" According to my tests, the effective speed of PCnet in transferring a file from one PC to another is about 15,000 bytes (characters) per second. This figure assumes a transfer from a RAM disk on one machine to a RAM disk on another machine, with PCnet connecting the two machines. For the test, I copied a file of 120,987 bytes using PCnet, with the file read from a memory disk at one end and written to a memory disk at the other. The average time in four trials was just over 8 seconds to transfer the file.

It's important to realize that the 15,000 characters-per-second data rate is calculated based on the amount of user data that is shipped in 1 second. All networks have

to send a substantial amount of "housekeeping" in addition to the user's data. But as a user, all I care about is how long it takes to get a certain amount of data from one machine to another.

To put the 15,000-characters-per-second effective transfer rate into perspective, PCnet can transfer the amount of data held on a DOS 1.1 double-sided diskette (320K) in about 22 seconds. Since most practical uses of a local network involve much smaller amounts of data, the answer to the question "Is PCnet fast enough?" is a definite "Yes!"

For additional testing of the speed of PCnet, I moved a small file with 53,626 bytes between various combinations of disk devices. To get an idea of how much overhead was involved with using a memory disk, it took only 0.75 seconds to copy the 53K file from local memory disk to local memory disk! Using memory disks on both computers with PCnet in between took 3.8 seconds.

With the Tallgrass hard disk used locally (no network involved), it took 3.09 seconds to copy the 53K file. It took 9.15 seconds to copy the file from a local memory disk to a remote hard disk using PCnet. However, it took only 4.14 seconds to copy the same file from a remote hard disk to a local memory disk using PCnet. (There's a reason for the large discrepancy: the Tallgrass disk does a "read after write" verification that slows down reading significantly.)

Interface Documentation

For OEMs and very advanced users, Orchid Technology will supply technical documentation for a low-level CSMA/CD datagram interface that can be used to construct high-level protocols. I want to stress that the vast majority of PCnet users would never need to learn these low-level technical details, since the high-level PCnet software does everything most people would want to do.

The documentation for the low-level network details is written for experienced 8086 assembly-language programmers. As such, it is fairly tough reading and could use some additional polishing. To experiment with the functionality provided by what Orchid calls the "Network Interface Operating System (NIOS)," my associate, Glen Fisher, wrote some programs in C that used the network system calls. We found that the NIOS system calls did what the specifications said they would do. Glen's programs were able to use the datagram service of NIOS to ship files over the network, without using any of the high-level PCnet or PC-DOS tools. I suspect that we may have been the first non-Orchid Technology customer to use these features, since we discovered some errors in the manual. After a couple of phone calls to Orchid, Glen got the system running. I want to emphasize that using the low-level NIOS is not a task to be undertaken lightly. It works, as advertised, but requires a significant amount of technical expertise.

Even so, I am impressed that Orchid makes the low-level "hooks" available for advanced users. Although it wasn't practical to build a significant application using the NIOS for this product review, experience convinces me that it would be possible and practical to undertake such a project if we needed to in the future. Orchid Technology provided very good technical support and was able to resolve our problems on the spot. For customers with special requirements, it will supply reconfigured network software that uses a larger packet size or allows more simultaneous streams of data to be active on the network at once. (Currently, the limit is three streams. If you are willing to use more memory for buffers, Orchid software is capable of handling 256 streams of data at once.)

PCNET IS ONE of the most cost-effective local networks currently available for the PC.

In summary, PCnet works well and is one of the most cost-effective local networks currently available for the PC. It is a medium-performance network adequate for most PC applications. Although there are faster networks for the PC, PCnet is fast enough for most users. It is also reliable and cost effective. If you need a local network, PCnet deserves serious consideration. */PC*

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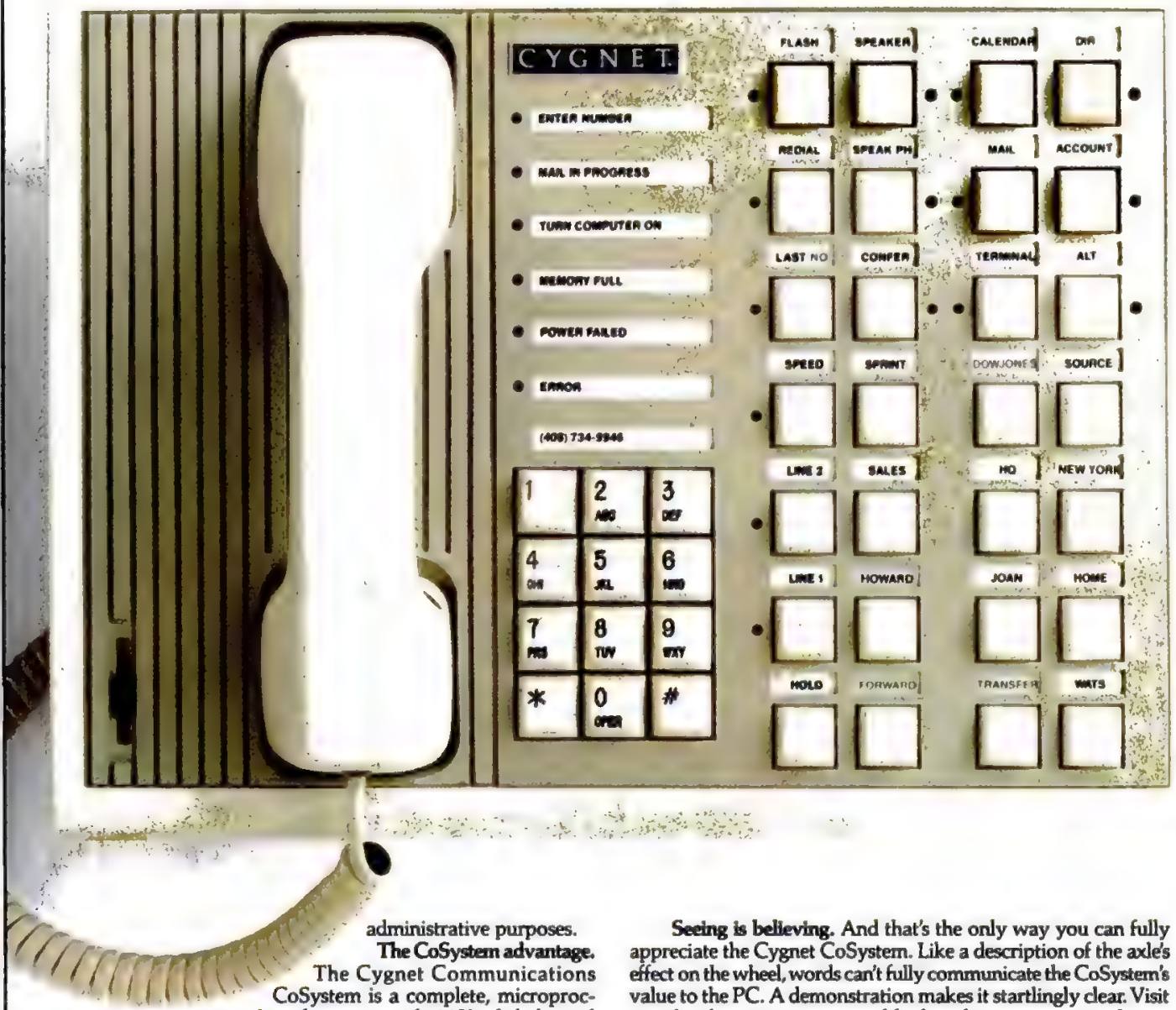
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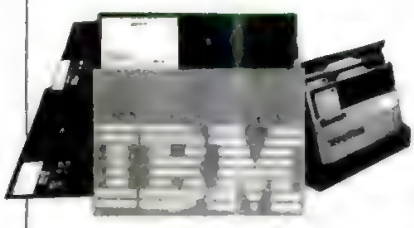
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CIRCLE 143 ON READER SERVICE CARD

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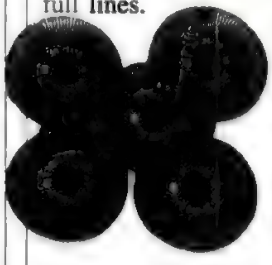
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Elite 12		W2006	W3006
Prestige Elite 12	W1007	W2007	
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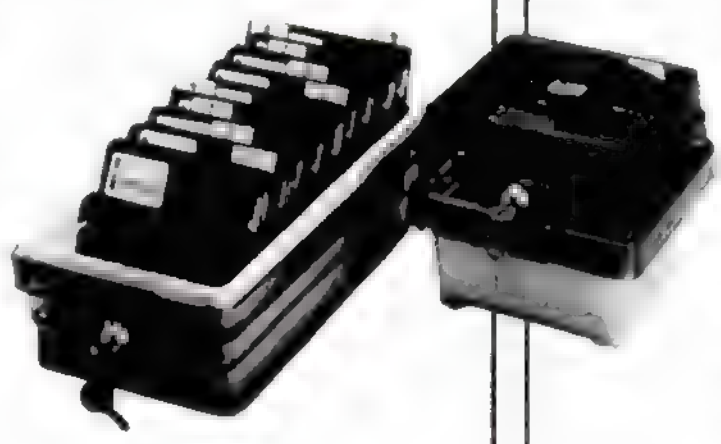
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CIRCLE 287 ON READER SERVICE CARD

Networking the PCs in your business provides simultaneous access to current information, but it may take some time to get the system running smoothly.

Getting The Net Working

Whether your business is a flower shop, a machine shop, or a semiconductor plant such as mine, you may find that the best way to solve your business problems is by using a local area network (LAN). Every business has problems. If time allows for a careful analysis and if the decision maker has immediate access to information from a wide range of sources, many of these problems can be solved fairly easily. Through interconnected personal computers, each of which shares hardware, data, and software for specific applications, a LAN can provide immediate information. The way your company uses its information, or data, determines whether it thrives in a particular marketplace or just gets by.

Several networks were reviewed in the August issue (see, "To LAN or Not to LAN," *PC Magazine*, Volume 2 Number 3). A local area network consists of two or more microcomputers that are linked over a wire cable. They usually share a hard disk and possibly hardware, such as a printer too expensive for each PC to have individually.

Networks for larger computers already conveniently provide access to copiers, light switches, the thermostat, and even automated warehouses. But the key word here is *conveniently*. In the world of microcomputers, true networking convenience is yet to be attained, but things are moving fast. Before long your PC will be able to send the inventory report directly to the copier, have it make seven copies, and print the names of those receiving them in the upper right-hand corner.

YOU MAY find that the best way to solve your business problems is by using a local area network.

But don't wait until then to consider using a network in your own business. Even though networking is just a baby, the currently available networks are already paying for themselves.

Hard Disk Storage

Virtually all networks offer common high-capacity hard disk storage. In a manufacturing operation, it doesn't take long before the necessary information outgrows the storage space of several floppies. Hard disks offer not only increased storage space but the opportunity for many users to access the information at the same time. If information, say the inventory in the stockroom, could be read from a shared hard disk by everyone who needed it, things could happen fast and with greater accuracy.

Even if only one person or department is adding to the database, all users benefit

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CIRCLE 276 ON READER SERVICE CARD

from having current information. If several users are adding to or changing the information independently of the others, networking is almost a necessity.

In a LAN several users can share the cost of expensive hardware and software. If one user needs a letter-quality printer capable of feeding letterhead sheets, other users can benefit from the printer, too. These two reasons alone—hardware-sharing and simultaneous access to a database—may justify the economics of linking your PCs into a network.

TELMOS' Omninet

TELMOS, Inc., has had Corvus' Omninet installed for 2 months. The net was bought to provide general office management capabilities, not to be the ultimate manufacturing control system for its semiconductor manufacturing operations (although several promising applications currently are being considered in this area). TELMOS has 50 employees and a network of five IBM PCs, which is more than large enough for the 15 employees who use it regularly.

The five PCs, each with a color monitor and a printer, share a 20-megabyte Corvus hard disk. Four of the PCs have Epson MX-100 dot-matrix printers; the other has a letter-quality Diablo 630 printer with a cut sheet-feeder option.

Each computer is equipped with 128K RAM, which is adequate for all but one application. Generating spreadsheets with Lotus' 1-2-3 requires additional memory.

Four PCs were assigned to specific areas: manufacturing, finance, marketing, and production control; the fifth is reserved for general use.

The network has been installed for only a short time, and, at present, is being used at a fraction of its capabilities. Network applications are being considered by each department, and as these are brought on line, system use will increase.

One of TELMOS' major network applications provides access to all the company's released documents and is managed through a nonlinked combination of word processing *(WordStar 3.3)* and database management *(Condor 3.0)*. This system extends far beyond the usual indexing of documents by number, title, and so forth. *Condor* structures the information for convenient use, so each of the departments can have an index tailored to its specific requirements, which can be called up as needed. All departments have access to all the indexes, but, for the most part, each department uses only its own.

Each of the semiconductor devices TELMOS makes can be sold in a variety of packages. Next time you take the cover off your PC and look, you will see several of the package styles available to a semiconductor manufacturer. Each has a specific purpose; plastic or epoxy packages are less expensive than ceramic ones, but the more expensive packages are more reliable and more resistant to humidity. Each package requires detailed assembly instructions with drawings, including such information as the type and size of interconnection wires used, the attaching medium for the die, the die size, the number of leads, the width of the package, and so forth. All this information must be cross-referenced to stock numbers and supplier's part numbers.

Each of the major departments in the company is interested in only a portion of the total information at any one time, but all the information must be immediately accessible and absolutely current. The marketing department may need a listing of all packages in which every product is currently available. This listing is an electronic copy of information contained in the database. Marketing's information is identical to the information in any other department. This is the point of the network: It generates the same information to any number of sources.

Other departments are interested in totally different summaries from the same

Restoring WordStar's Color Border

A short program to solve one problem that occurs when using WordStar in a network.

If two or more users share *WordStar 3.3* on a network, they all must use the same color selection and the same definition set for the ten function keys. If two users like magenta letters on a red background, you're stuck with them too, unless you do the choosing. One way around this problem is to get your own copy of *WordStar*, but that defeats the purpose of the network.

In *WordStar 3.3*, you can have any color of border so long as it's black. *WordStar* turns *off* the border color no matter what you and your fellow network users decide.

From within *WordStar*, however, you can run a program from the main menu by entering the command R followed by the name of the program. Using this feature, you can run a short BASIC program to turn the border color back on and each of you can choose your own color for the border. Here's how.

First call BASIC and enter this short program:

```
100 COLOR  7,1,2
110 CLS
120 SYSTEM
```

This gives you (temporarily) white letters, blue background, and green border, a much better choice than magenta and red. Or choose your own colors according to the instructions in the BASIC manual.

Save this program under the name BORDER with the command:

```
SAVE'' d:BORDER
```

Use the drive where you want BORDER saved instead of d:.

Now whenever *WordStar* comes up in living color minus the border, you can set the border color from the main *WordStar* menu:

```
Press:
Enter:
Press:

R
d:BASIC
Enter


d:BORDER
```

(d: is the drive designator where you have BASIC and BORDER stored.)

Watch the magic show!

When *WordStar* says, "Press any key to return to *WordStar*," press the space bar or whatever and you have *WordStar* with your border color still turned on!—*J.F.C.*

database. Production control can determine all the devices using a 24-lead ceramic dual-in-line package, for example, adjusting its stock levels according to expected usage. The summary of usage by package type can be made directly by production control on the identical information used by marketing or engineering. Neither department needs to know that the information is being accessed at the same time by another user, but all can be confident that the information is current and accurate.

Unfortunately, getting the network up and running is not painless. Microcomputer networks may be more painful than most, although the end result is probably worth the effort and cost required to make the net work.

Documentation

Most of the documentation that came with Omninet and the individual software packages was either incomplete or, as someone said, "written for a compulsive problem solver." One of the manuals that came with the system contains cartoons, but its attempts at humor fall very flat when you can't get your system working. If you buy a network now, be prepared to spend more time than you thought you would figuring out the system; the manuals won't be much help.

Software

Many of the applications programs currently available to network users have a number of minor problems. For instance, some programs actually turn the color display off when you have it set to on. The new *WordStar* turns off only the border color; there is a way to turn it back on, but it's inconvenient. Many of the network versions of widely used applications are not yet fully debugged. Also, networks are not yet capable of some sophisticated tasks. For instance, interrupting another computer on the network to pass information to its user and expecting that computer to resume its former task cannot be done, at least not safely. But all these things will come. What is needed now is a clear understanding of the network's capabilities to all potential users so they don't get discouraged and revert to erasers and carbon paper.

The first and real giant step toward accomplishing this goal is the manual by Dennis Kemmerer written for the *BUSINESSLAND Office Automation System*. This manual is the finest piece of technical writing that I've seen to date for the microcomputer field. Without it, the network would be difficult to understand at best. BUSINESSLAND recognized that Corvus' Omninet is inconvenient to use and designed a software package that oversees the network; it is a supervisor program that provides menus to invoice the network's operations.

Overall, local area networks can be a worthwhile investment with immediate rewards, but they are costly, both in capital investment and time required to get them operating. The warranty will be slipping away and the shine will be well worn off the hardware before you will be able to say for sure, "The net works." */PC*

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Plain talk about printers...

Dot Matrix Printers

There've been some big changes in IBM PC printer compatability. Okidata's new Plug-n-Play ROMs (see below) make a Microline 92 or 93 fully compatible with PC screen graphics. We expect that other printer manufacturers will offer similar upgrades shortly.

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Gemini 10X/15
Delta 10/15



The **Gemini 10X** (120 cps) features 10, 12, 17 cpi, italics, a correspondance font, 120 x 144 dpi graphics matrix & a 1K buffer. The **Gemini 10X** comes with friction/tractor feed & uses plain spool ribbons. The **Gemini 15** is the 132 column version, & it has a proportional font.

Star's **Delta 10** features both parallel *and* serial interfaces, 160 cps print speed, an 8K buffer, plus the standard fonts (10, 12 & 17 cpi), dot graphics, friction/tractor feed and spool ribbons. The **Delta 15** is a 136 column version.

Gemini 10X	**$309.88**
Gemini 15	**$459.88**
Delta 10	**$529.88**
Delta 15	**$CALL**

OKIDATA

Microline Series



The Microline 92 (80 col) & **93** (132 col) are ideal for word processing. They offer a 160 cps draft mode, a 40 cps correspondance mode, 10, 12 & 17 cpi (w/double-width), pin/friction feed (tractor is optional on the **92**) & dot-addressable graphics (120 x 144). Centronics parallel interface is standard; the serial (RS-232C) interface is optional.

A new PROM called **PC Plug-n-Play** turns a **92** or a **93** into an IBM printer, with full screen dump capabilities. You will sacrafice a few features (like 12 cpi) but the PROMs are worth it if total compatibility is your goal.

The **Microline 82A** (80 col) & **83A** (132 col) are data crunchers, period. They print 120 cps, at 10 & 16 cpi (5/8 double-width). Dot-addressable graphics are optional.

The **Microline 84** (132 col) is the Step 2 version, featuring 200 cps at 10, 12, & 17 cpi (w/double-width), all with a correspondance mode & dot addressable graphics. Parallel or serial (RS-232C) interfaces available.

Microline 82A	**$389.88**
82A/92 Tractor	**$59.88**
Roll Paper Holder	**$49.88**
Microline 83A	**$599.88**
82A/83A Okigraph 1 Graphics ROM	**$49.88**
Microline 92	**$459.88**
Microline 93	**$759.88**
92/93 IBM-PC Plug-n-Play Graphics ROM	**$49.88**
92/93 RS-232C Interface	**$99.88**
Microline 84	**$1024.88**
w/RS-232C Interface	**$1139.88**

DIABLO

Series 32

Diablo has now entered the dot matrix printer market, and their new **Series 32** (150 cps) looks very promising. It features 132 column, with 10 or 16 cpi, plus a near-letter quality font. It has all the sub/superscripting features you'd expect, plus both dot & block graphics. We can't tell from the spec sheet, but we assume the **Series 32** is Diablo compatible.

Series 32	**$CALL**

MANNESMANN TALLY

MT-160 L
MT-180 L
Spirit



The **MT-160 L** (160 cps) is a sharp printer. The 10, 12, 17 & 20 cpi, plus correspondance font, makes the **MT-160 L** very versatile. It has both parallel & serial (RS-232C) interfaces, and the menu-driven installation from the control panel is easy to use. Friction and adjustable tractor feed are standard issue. The **MT-180 L** is the 136 column version.

The **Spirit** (80 cps) is Tally's new, low cost draft printer. It has 10, 12 & 17 cpi fonts, friction & adjustable tractor feed, and a unique square-wire printhead that makes even draft printing a pleasure.

MT-160 L	**$679.88**
MT-180 L	**$849.88**
MT-Spirit	**$329.88**

Other Dot Matrix Printers,

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DP-9620	**$1539.88**
DP-9625	**$1689.88**
WP-6000	**$2279.88**
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Prism 80	**$1079.88**
w/4-color	**$1439.88**
Prism 132	**$1239.88**
w/4-color	**$1689.88**
MicroPrism	**$569.88**
Inforunner	
Riteman	**$349.88**

Letter-Quality Printers

The new, low-speed letter-quality printers are making quality afforable. And the high-speed models are coming down in price too. Still, get a dot matrix printer for drafts & as a backup.

C. ITOH

StarWriter
PrintMaster



The C. Itoh **StarWriter** (40 cps) offers top speed at a good price. It uses Diablo code, wheels & ribbons, 10 or 12 pitch, 6, 8 & 1/48" line space, plus 1/120" horizontal spacing—ideal for proportional modes. We've found the **StarWriter** exceptionally reliable.

The **Printmaster** has the same specifications, but prints at 55 cps.

Starwriter Parallel	**$1219.88**
Printmaster Parallel	**$1569.88**

SILVER REED

EXP-550/500



The Silver Reed **EXP-550** (17 cps) is a 132 column letter-quality printer with 10, 12 or 15 pitch, sub/superscript, underlining and *true* Diablo 1610 emulation, making it compatible with most word processing software. It's friction fed, and it features a page injector; an optional tractor is also available.

The **EXP-500** (12 cps) is a 100 column letter-quality printer with the same specs as the **EXP-550**, but slower and without page inject or a tractor.

EXP-550 (Parallel)	**$699.88**
EXP-550 Tractor	**$139.88**
EXP-500 (Parallel)	**$469.88**

NEC

Spinwriters

The new **2000** Series are slower (20 cps), but they've retained all the qaulity of the 3500/7700 Series. Uses the same thimbles & ribbons.

2010/2030	**$1049.88**
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3530	**$1759.88**
3550	**$2009.88**
7710/7730	**$2289.88**

SMITH-CORONA

TP-1
Messenger



The **Memory Correct III Messenger** (the full name) is ideal for the home or small office. It combines the features of an electric typewriter ***and*** a letter-quality printer. It features 12 cps, 3 pitches (10, 12 & 15), variable line spacing, 10.5" writing line, backspacing & auto-correction. It comes complete with parallel/serial interface.

The **TP-1** has fixed pitch (10 or 12 cpi) & underlining, but cannot sub/suprscript. The tractor feed is optional. (Specify 10 or 12 cpi when you order.)

Memory Correct III Messenger	**$629.88**
TP-1	**$459.88**
TP Tractor	**$139.88**

Other Letter Quality Printers

Comrex	
CR-1	**$849.88**
CR-2	**$509.88**
Diablo	
620 (RS-232C)	**$999.88**
630 (PC)	**$1979.88**
Qume	
Sprint 11+	**$1539.88**

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USI

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QUADRAM

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The **QuadChrome** has the same spec's as the HX-12. Same price too.

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QUADRAM

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USR

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Please call (603) 881-9855 for further specifications, price and delivery.

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DC HAYES

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The **Smartmodems** are originate/answer, auto dial/answer, full/half duplex modems. There are two external modems (300 & 300/1200 baud) & the **1200B** (300/1200 internal for the PC). Modular phone cable & power supply included. (RS-232C cable is optional).

"Stack" Smartmodems

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300/1200 baud **$539.88**
1200B w/Softcom II..... **$459.88**

US ROBOTICS

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The **Password** is an originate/answer type modem. 0-300 & 1200 baud capability with auto dial/answer, auto mode/ speed select, full/half duplex (local echo),audio phone line monitor. Comes with an RS-232C cable (specify male or female DB-25), power supply & modular telephone cable.

Password **$379.88**

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M-Term..... **$79.88**

Peripherals

AST RESEARCH

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The **MegaPlus** has one RS-232C port, a parallel port, a clock & up to 256K RAM. An optional game and second serial port are also available. Comes with SuperDrive/Spooler software.

The **MegaPak** is a 128K or 256K piggy-back card that attaches to the MegaPlus & gives you additional memory to 256K.

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AST RESEARCH

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AST I/O Plus II

The **I/O Plus II** has one parallel port, one RS-232C port, one game port & a clock. A second RS-232C port is optional.

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QUADRAM

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The **Quadboard** has an RS-232C port, a parallel port, a clock & memory up to 256K (you can also get your **Quadboard** "naked," with no memory installed). QuadSpool/Drive software is included with every **Quadboard**, along with a one-year warranty.

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Quadboard 64K..... **$279.88**
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QUAD 512+

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Quad 512+ (512K)..... **$679.88**

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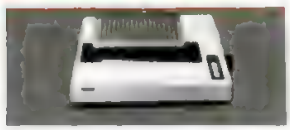
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IBM EYE/WINN L. ROSCH

The investment world has altered its view of Big Blue's stock since the PC burst upon the scene. But there's more to IBM's success than the popularity of its little beige box.

IBM's Post-PC Image

Among the multitude of miraculous powers attributed to the IBM PC, notably absent is the capability to restore lost youth. Although playing its best games may make you feel younger, and its business-software applications might prevent a few gray hairs, the PC can neither chase away your wrinkles nor erase years from your birth certificate.

On the other side of the sales counter, however, some magic elixir has restored the sparkle to at least one tired old gentleman. According to many leading business reports and analysts, the PC has indeed become a financial fountain of youth that has revitalized middle-aged IBM.

A look at the figures, pre- and post-PC, offers a compelling argument for the restorative effect the PC has had on IBM. Before the introduction of its personal computer, IBM was languishing on Wall Street. Its stock was stuck in the 50s and 60s, and the bottom line on the 1979 financial statement showed the first decline in earnings in 30 years, from $5.32 to $5.16 per share. The next year brought marginally better numbers, $6.10 per share, but in 1981 IBM retreated again to $5.65 (unadjusted). Investors and analysts wondered why the fortunes of one of their favorites had faltered.

Just a little more than 2 years ago, the word on the company wasn't good. *Financial World* went so far as to ask, in a May 15, 1981, story, "What Ails IBM?" On July 15, 1981, *The Wall Street Journal* portrayed IBM as a "dull performer." From a mid-1970s price/earnings ratio of 20—near the top of the list—IBM dropped to a 10 multiple over the next 5 years—little better than the market average. After 30 years of growth at an amazing 20- to 22-percent rate, the whiz kid of the 50s and 60s had suddenly become a doddering old codger—his front-runner status reduced to that of another market also-ran.

Enter the PC, and 2 years later the stock had climbed nearly two and a half times in value, beyond 120. In early 1982, 5 months after the introduction of the PC, IBM projected that long-range earnings would nearly double by 1984, to $10 per share or more. The 1982 balance sheet showed earnings up sharply, to $7.39, and estimates for this year approach $8.50 or $9. Clearly some magic has been at work.

A Drop in the Multibillion-Buck Bucket

It's tempting to credit much of the turnabout to the little box that couldn't even add correctly when it was released. Financially, however, the PC is only a small part of the IBM picture, and personal computer sales make up only a fraction of IBM's total revenues. According to stock market and computer industry analysts, the PC's performance has little direct financial effect on its giant parent.

"IBM has done very well financially over the last few years but not necessarily because of the PC," noted Esther Dyson, personal computer industry watcher and president of Rosen Research, publisher of *RELease 1.0*.

"The introduction of the PC and the rise of IBM is not a direct cause-and-effect relationship. A lot of people have underestimated IBM's prowess in other areas," observed Jonathan Fram, IBM analyst for Paine Webber Mitchell Hutchins, Inc. "Early on, the company recognized the strength of foreign competition, Japan particularly, and it took definite steps to free up its thinking.

"Certainly the PC has affected IBM on a number of levels. It has produced an unforecasted revenue windfall. The company has sold more units than it envisioned at the inception of the program," he admitted, estimating that the PC's share of IBM's 1983 income will be about $1 bil-

lion, and $2 billion to $3 billion in 1984. "But with a company the size of IBM [estimated 1983 income is about $30 billion to $40 billion] that additional revenue is not enough to take the stock from 50 to 120."

The sales success of the PC has not been the only good news to contribute to IBM's renewed vigor on Wall Street. Most PC users are aware that the complete IBM product line includes a number of items besides their beloved personal computer—like mainframe computers, which account for more than half of the machines sold in the United States today. IBM's largest computer, the 3081 mainframe, also was well received. As with the PC, orders for it have stacked up faster than they can be filled.

Much also has happened to IBM outside the new-products arena in the last 2 or 3 years. Notably, the federal government dropped a 13-year-old antitrust suit against the corporation. IBM's share of the mainframe-computer market had dwindled from 70 percent to a mere 62 percent,

EXPERTS predicted that the good news about the antitrust suit would send the price of IBM certificates soaring. It didn't.

and the government felt that the company no longer dominated the industry. When the settlement was announced, on January 8, 1982, five months post-PC, experts predicted that the good news about the antitrust suit would send the price of IBM certificates soaring. (Headline in *The New York Times* on the morning after the announcement: "Rise Seen for Stock of I.B.M.") It didn't—at least not immediately—but many analysts believe the suit settlement led IBM to develop new, more aggressive pricing policies.

Less than a year before the personal computer was unveiled, new IBM president and chief executive John R. Opel took the corporate helm. Under the new skipper, IBM departed from corporate tradition and bought a 12-percent interest in Intel (the maker of the PC's 8088 microprocessor brain). According to *The New York Times*, Opel's leadership has been marked by "a new flexibility."

Of course, IBM has not been the only company whose economic star has risen of late. Bulls began charging onto Wall Street a year ago, and the entire stock market soared to record highs.

"Two or three years ago nearly all high-technology stocks were priced at one-half of what they are today," noted Kenneth G. Bosomworth, president of International Resource Development, a market research and consulting firm. "IBM's increase would have happened even without the PC."

A New Image

A company's fortunes depend on more than just the twists of the ticker tape; image is important, too. It can determine how consumers view an organization, how and by whom its stock is traded, and how its employees feel about working there. Even if the PC hasn't had a major financial effect on the corporate colossus, it has revealed a new and different IBM to the world.

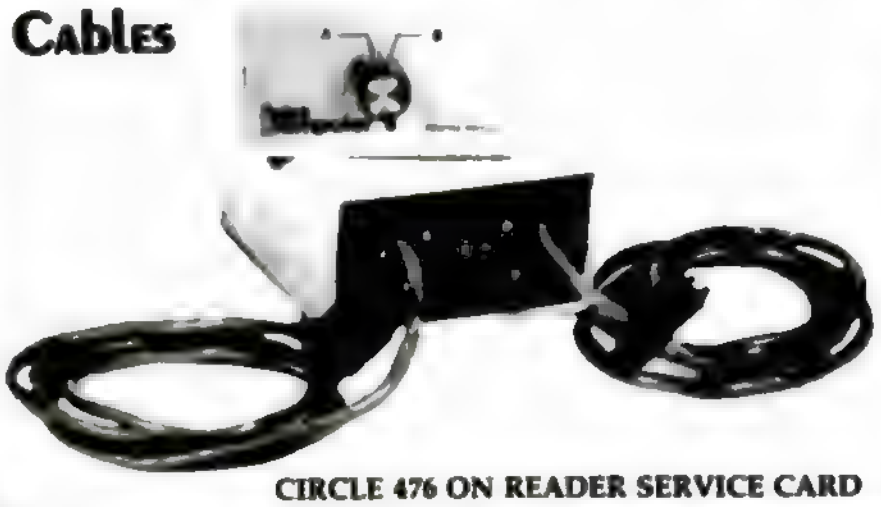
"The PC has done a lot for IBM in the public mind," said Dyson. "It's helped change the corporate image and made IBM seem more human, more friendly, and more approachable.

"The PC has helped make IBM what I call a 'stomach stock,' a stock that's in the experience of the common man. It's a company whose product he has seen and touched. Other stocks do not touch his life personally," Dyson continued. Her stomach stocks are those of companies active in selling to the consumer market. The PC was IBM's first product to attract notable individual-consumer interest. "The changed image probably helped some, even though institutions rather than small investors are the big holders of IBM's stock." (Pension funds and other institutional investors hold about 55 percent of IBM's stock.)

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Some analysts believe that IBM's new image has influenced institutional investors as well. In pre-PC 1981, *Financial World* noted that IBM stock was perceived as "tired merchandise" with "lackluster price performance" that made it "a drag on portfolios." The "sleek lion" reigning over the corporate jungle had become a "lumbering elephant." Analysts figured that IBM had gotten too big and had been overcome by inertia. Newer, leaner companies were outpacing the sleeping giant. Digital Equipment Corporation (DEC), particularly, had grown to be number two in computers, according to some analysts, because IBM was too slow in entering the minicomputer field.

When IBM led the market upward 2 years later, *The New York Times* asked, on April 15, 1983, "What changed the outlook for the company after years of uninspired performance?" The answer was, in part, its success in entering the personal computer market.

"The PC was a good move PR-wise," noted Bosomworth. "It positions IBM as a company that is not going to be outpaced, as it was when DEC entered the minicomputer market. Clearly IBM let DEC go too far. By introducing the PC, IBM did not let that happen with micros. If they had not entered the market, it would have suggested that they had been caught napping again."

"Wall Street is enamored of IBM because the company is able to do progressive things," added Fram. "Usually investors are leery of progressive companies, but IBM is progressive and trustworthy."

"In my estimation, the PC has made it clear that IBM is more vigorous and open-minded than it once was," said Dyson. "It's shaken up IBM a bit. The company had its eyes opened to a new market and a new style of operating. Suddenly IBM looks a lot more adventurous. It's making returns by taking risks, beginning to live more dangerously, and I like that."

Indeed, not only has the PC presented the world with a new image of IBM, but it has given IBM a new view of the world. The popular micro is far more than just another desktop device: it's a reflection of IBM's philosophy. And it reveals some recent changes in that philosophy—changes that may have been caused by the PC itself.

"IBM wants a PC on the desk of every executive/white-collar worker," said Fram. "It wants to have 20,000,000 work stations out there by 1990. That's enough that it can have market control."

THE PC has indeed become a financial fountain of youth that has revitalized middle-aged IBM.

"IBM figures that something is going to end up on every executive's desk, and it might as well be an IBM," affirmed Bosomworth. "An essential element of IBM's strategy since the days of the first tabulating machines has been to get into the Fortune 500 companies and get them as dependent on IBM as possible."

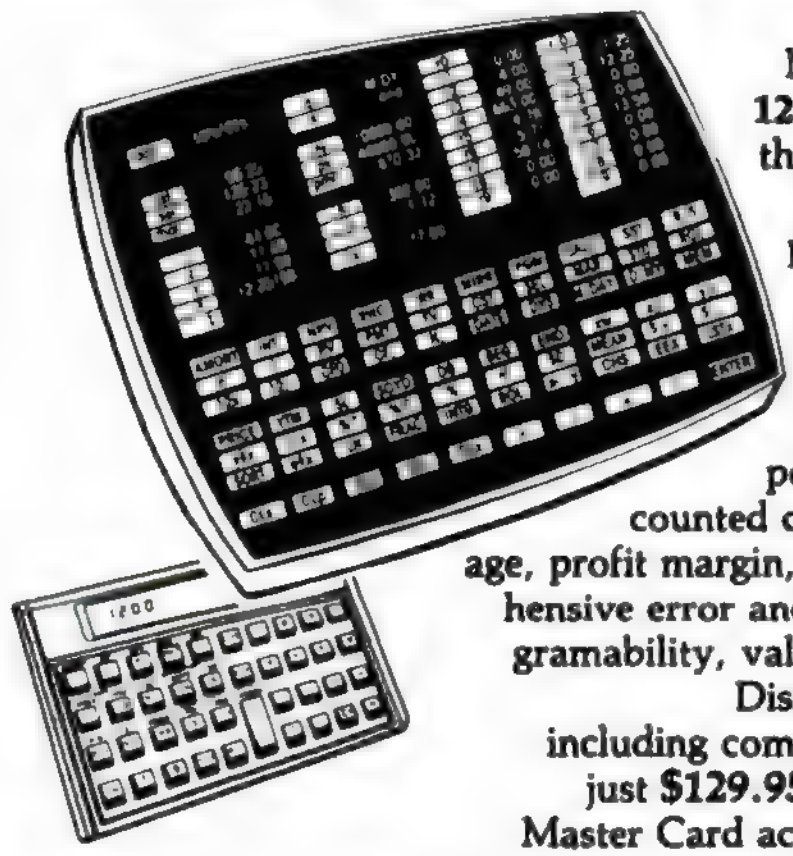
"IBM's strategy has changed. It recognizes that its growth will be in different areas than it has been in the past. Now IBM is looking to integrate the whole office, and it has centered a key part of its growth strategy on the PC," said Fram. "It has begun to integrate other products around the PC. The company already has PC emulation in just about all of its work stations."

A Hint of Things to Come

At just more than 2 years old, the PC is still too young for its full potential and consequences to be seen and measured, even by the wizards of Wall Street. Already, it has grown from a speck on an enormous corporate spreadsheet into the brightest twinkle in the eye of an old giant—a twinkle that belies the very clever thoughts going on in the giant's head.

Only by looking back years from now will all his secrets be known. Perhaps far from being just another product, the PC will someday be looked upon as the cornerstone of a new philosophy and a new IBM. */PC*

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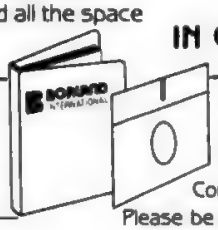
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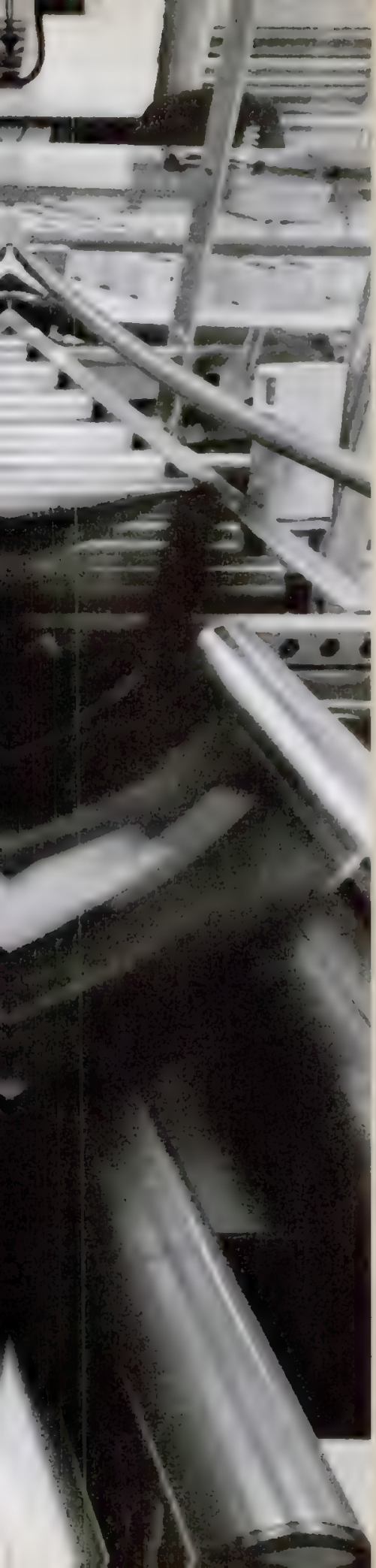
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IBM Assembly: The Inside Story

As you drive through the environs of Boca Raton and Delray Beach, you can't help but be struck by the verdant bleakness found only in southern Florida. The susurrations of cars and trucks are jarringly at odds with a place where once the loudest sound was the occasional thud of a coconut falling to the ground. Buildings the color of earth and sand rise monolithically from the landscape, their right angles and hard edges claiming dominance over nature. As you turn into the drive, the letters IBM, subtly displayed on a sign, suddenly alter your perception of the entire scene, replacing the intrusive nature of the buildings with a new vision of a corporate network that spans the globe, dwarfing the local countryside.

The building is IBM's final assembly/manufacturing point for PCs and XTs. You enter, perhaps expecting magic. What you see is a clean, modern assembly plant that just as easily could be used to build fire extinguishers and blenders. Not that the techniques are not state of the art. In fact, they may be more so than the product, the PC.

Some interesting facts gleaned from the tour include the following:

- Each PC is assembled by one person. It is not built on a TV-type assembly line.
- Each PC is tracked from chassis to final

Photography: Dennis Bettencourt Brian Dessin Dav





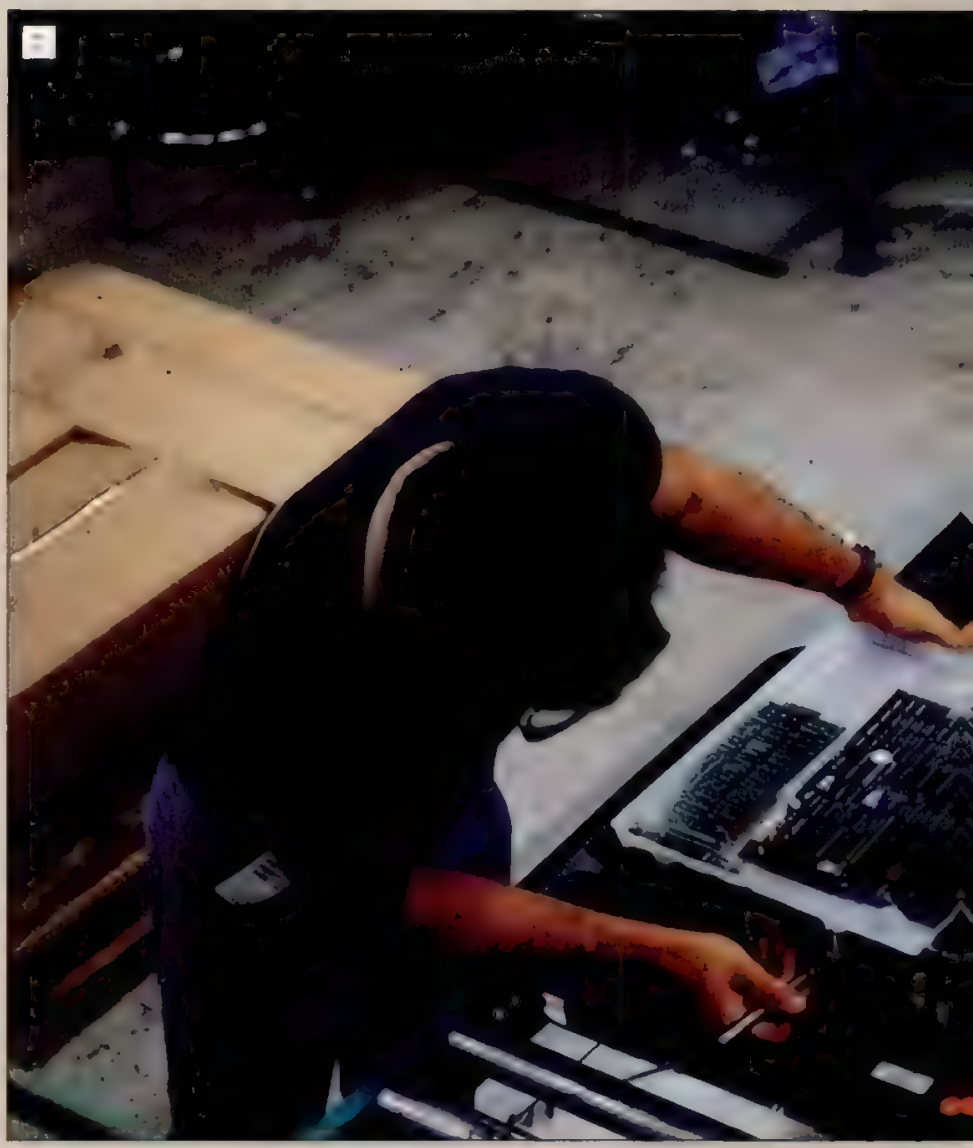


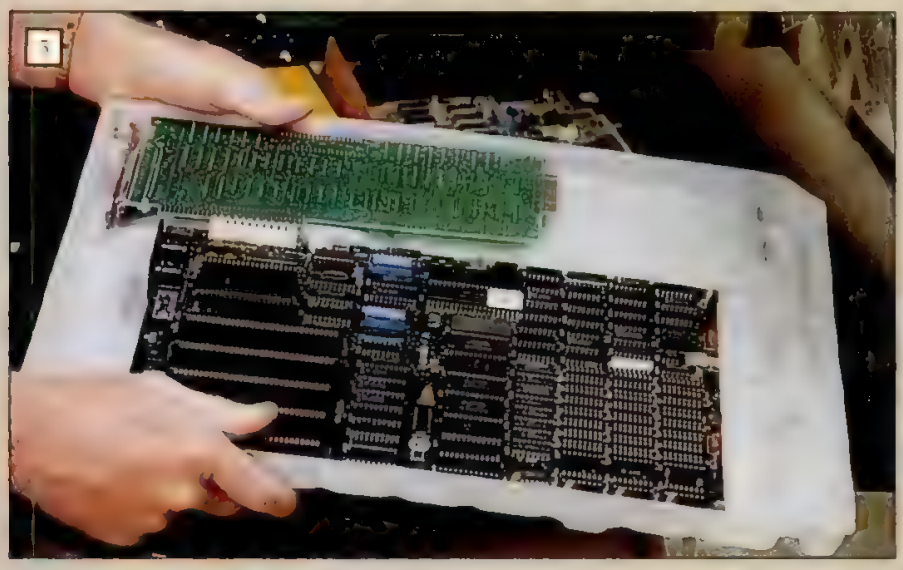
shipment using UPC-like bar-code readers.

- PCs help to build PCs. Modified PCs govern much of the quality-control testing process.
- Each PC or XT is "kitted," that is, all the necessary parts are placed in a box, and the chassis is placed on a pallet for its trip to the assembly line. The pallet is connected electrically to the PC, providing AC and keyboard connections for use in automated testing. The test equipment "keys in" instructions to the PC; a monitor connection "sees" the result.

The factory is quietly busy. Without raising much of a fuss, it cranks out (we estimate) between 3,000 and 4,000 machines per day in three shifts. After packaging, the machines ride from one building to another via a conveyor into an automated warehousing system. A huge grid of girders, rollers, and slides stores the PCs, much like pieces in a gigantic 3-D chess game.

Come with us as we tour the plant; we think you'll like the show. */PC*







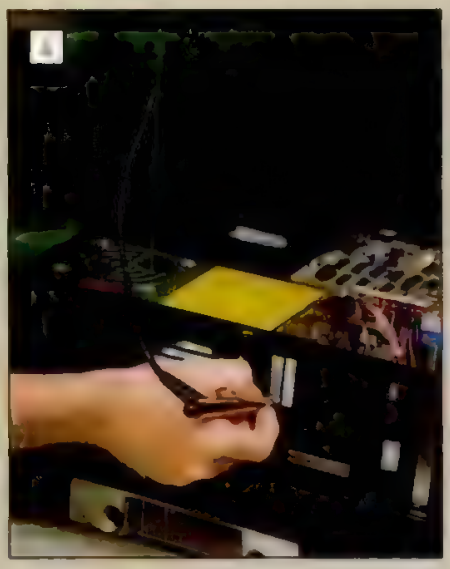
1 Life begins for the PC as a serial number sticker is attached and entered via bar-code reader into the manufacturing system.

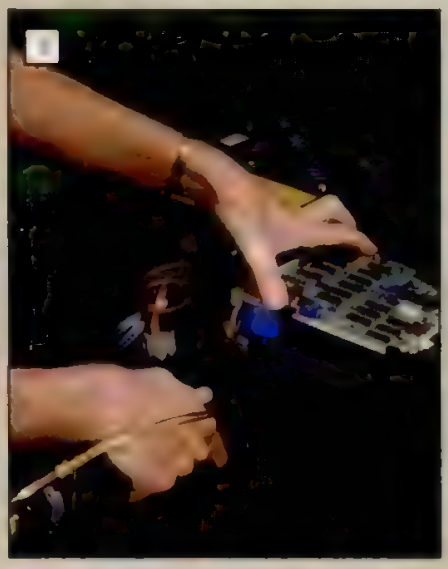
2 PCs are "kitted" for assembly with all the necessary parts placed on the pallet or in a tray.

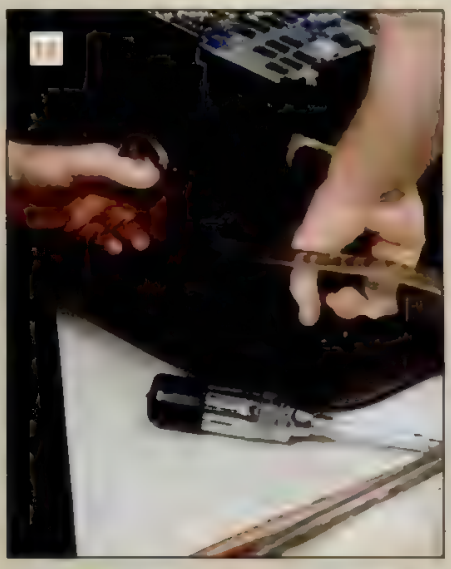
3 Kitted PCs line up on the rollers, waiting to coast down to available assemblers.

4 Roll out! PC kits head down the line for assembly.

5 The assembler removes the kit tray from the pallet in preparation for putting the PC together.





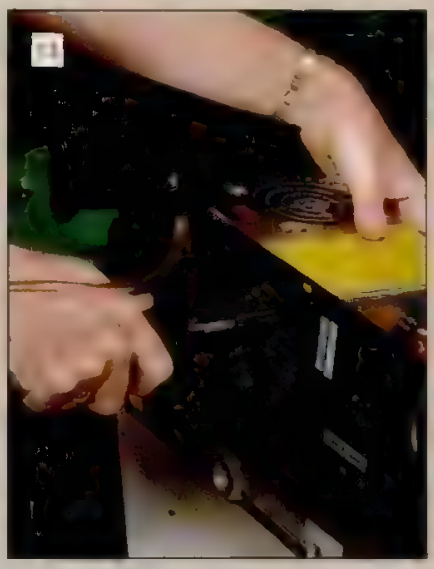


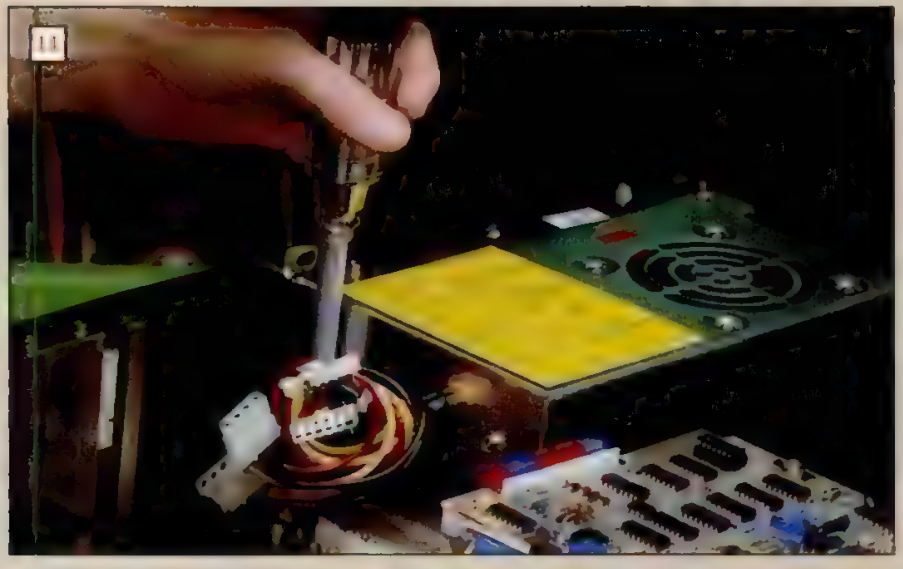


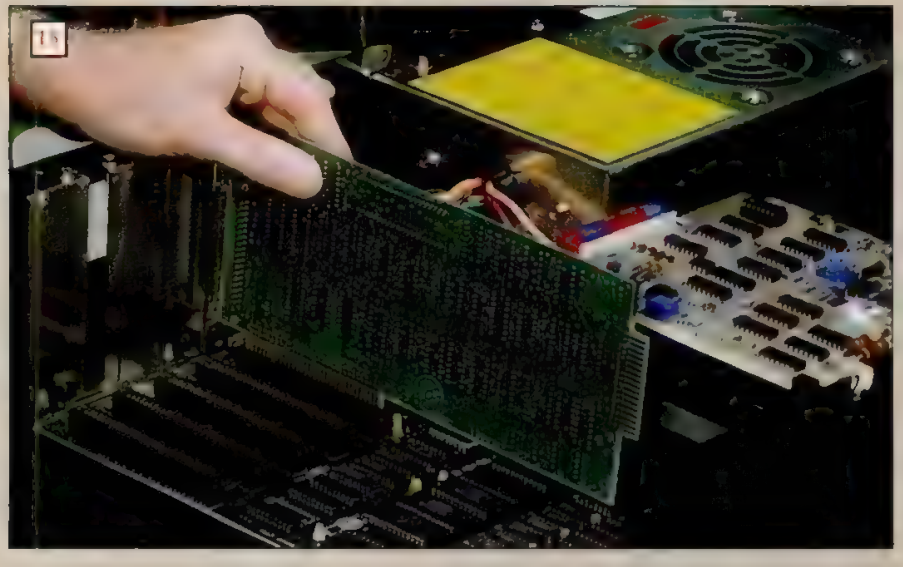












6 *The bar-code wand informs the manufacturing system that a PC has arrived at a particular work station.*

7 *Even with bar-code readers tracking the machine, the assembler still must document phases of the construction process.*

8 *The assembler prepares to insert the system board into the chassis. The system board already has been tested by IBM personnel stationed at the vendor.*

9 *An air-powered screwdriver feeds the screws from a bin, aligns them, and drives them home automatically, here securing a disk drive.*

10 *The speaker and bracket go into place, again using standard-size screws fed from the automatic screwdriver.*

11 *The assembler inserts a test/diagnostic disk for quality control and burn-in testing.*

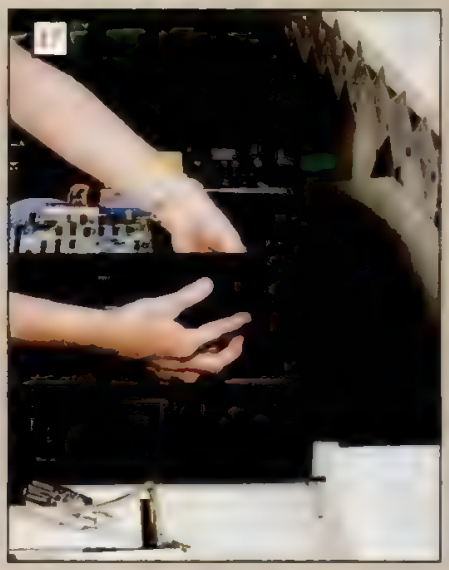
12 *A special template ensures that the labels on the rear of the machine are aligned properly and consistently.*

13 *A few quick shots with the air screwdriver and the power supply is firmly in place.*

14 *Final tightening of the screws holding the system board. The screwdriver has a built-in torque limit, preventing overtightening.*

15 *The disk controller card, positioned for insertion.*







16 *The assembler then positions the ribbon cables connecting the disk drive to the controller card.*

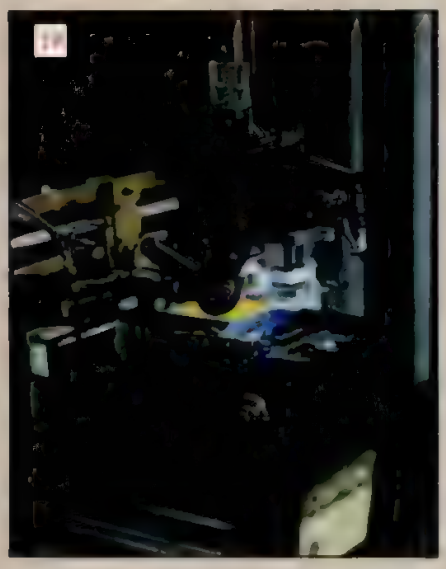
17 *On a single-drive system, a blank cover is fitted.*

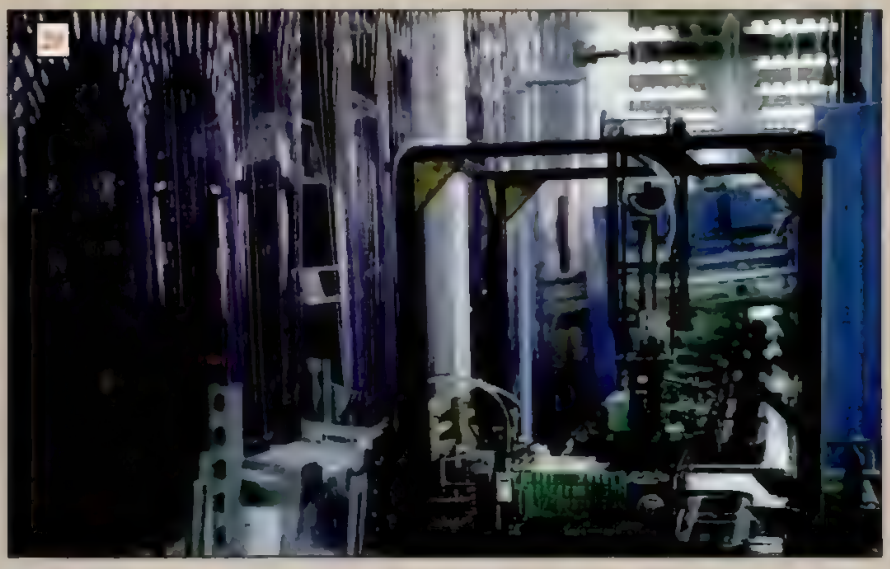
18 *Initial test and burn-in area. Note PC used to control a phase of the testing.*

19 *A robot arm turns the PC on for the first time and go/no go tests determine whether it will go to burn-in or back for rework. Microphone (disconnected here) detects unusual noises.*

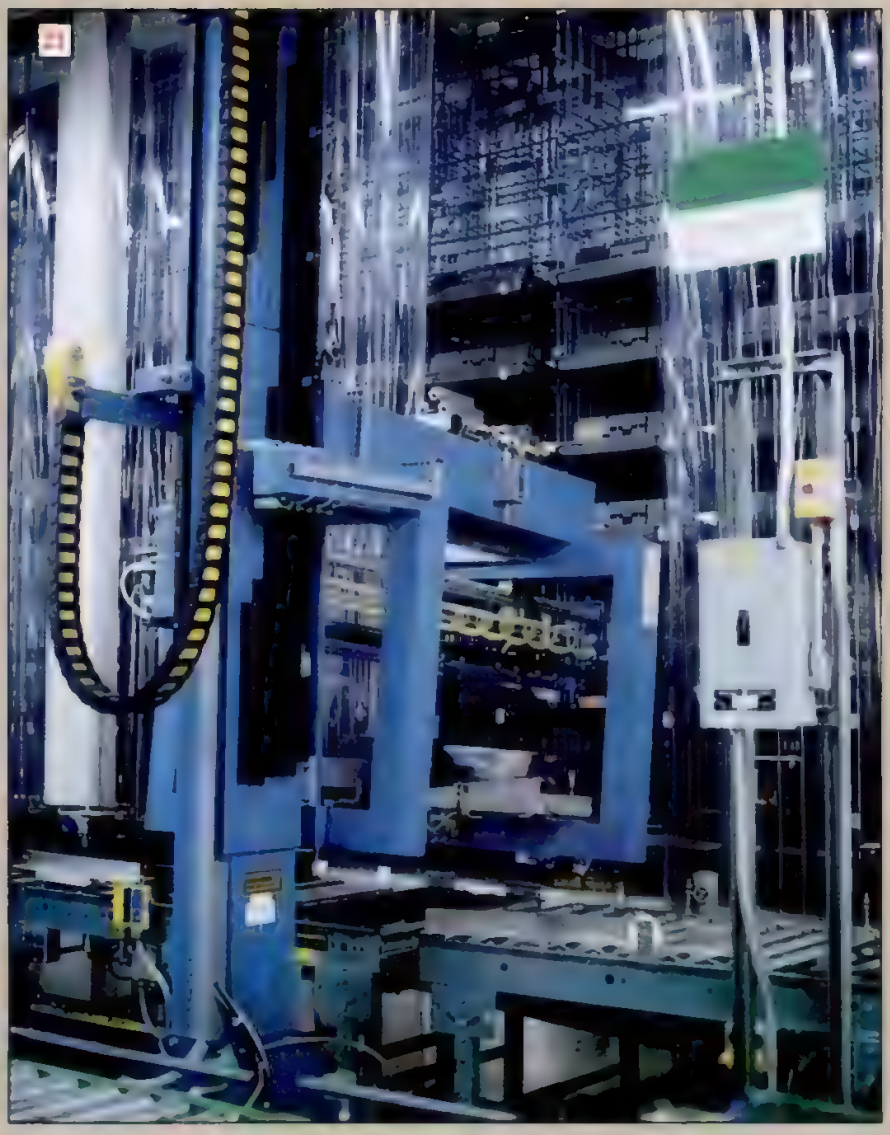
20 *PCs en route to the 3-hour burn-in test. Plastic wall controls dust, keeps burn-in area slightly warmer than the rest of the plant.*

21 *Large robot arm takes PC from assembly line and places it in a tier on the burn-in rack.*









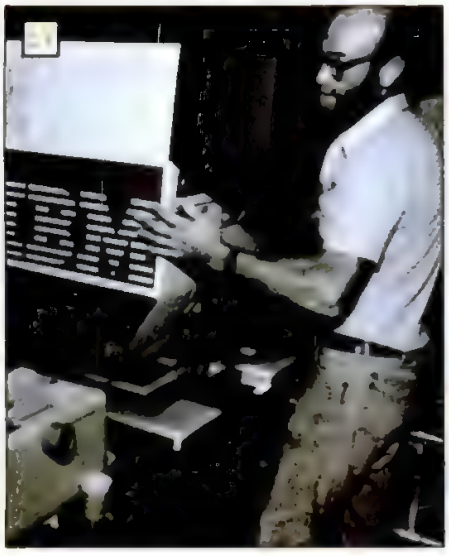


22 *After burn-in, cover goes on, packing begins. Here, vacuum arm lifts completed PC from pallet, holds it for "diapering" with protective plastic.*

23 *Worker positions box above PC, pneumatic arm lifts it into box, closes flaps. Printer provides label identifying machine by serial number after cross-check by bar-code wand.*

24 *What your local ComputerLand wouldn't give for a few of these! Palletized boxes of PCs await shipment.*

25 *Out the door! Finished PCs are shipped to dealers all over the world.*







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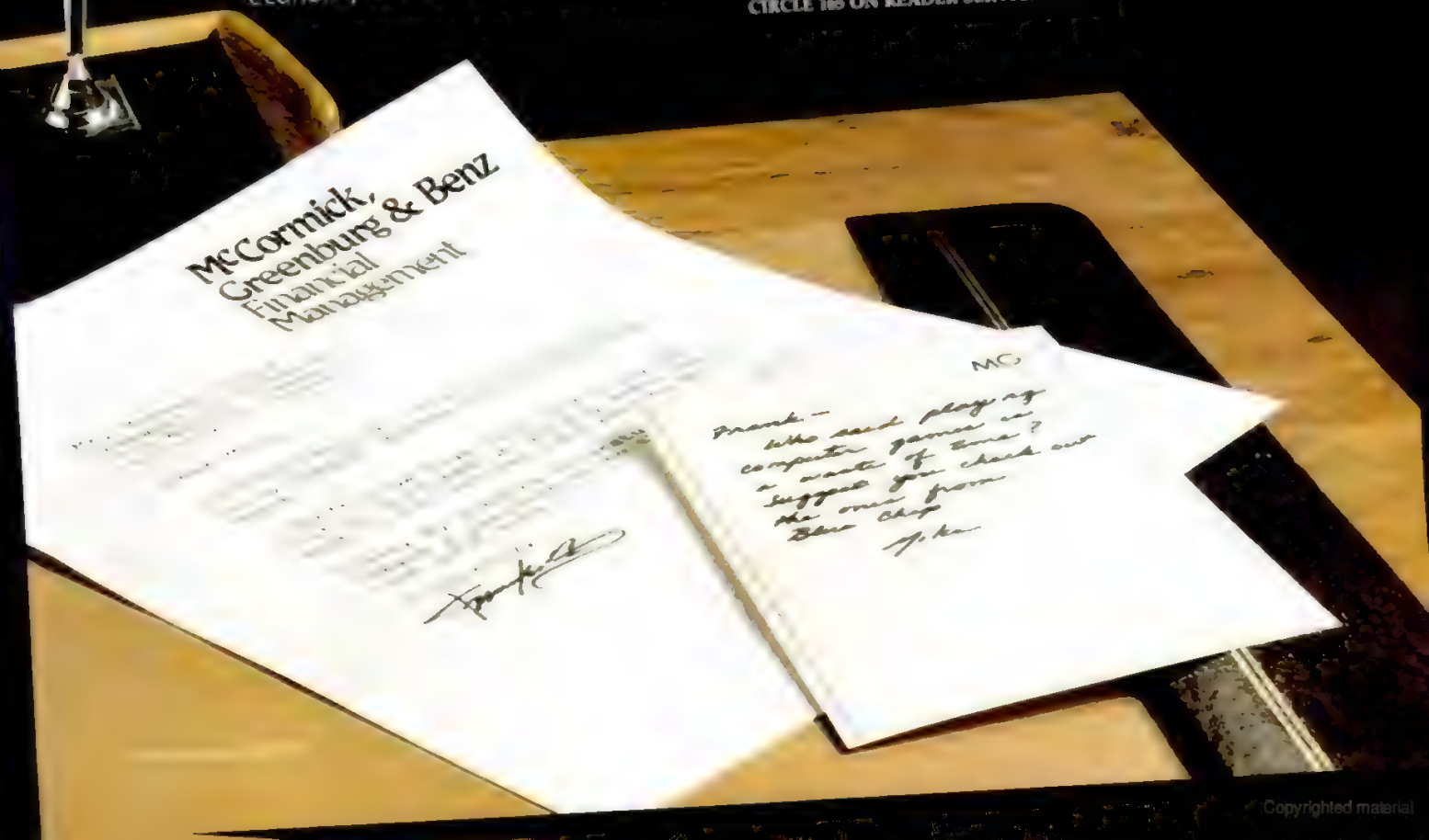
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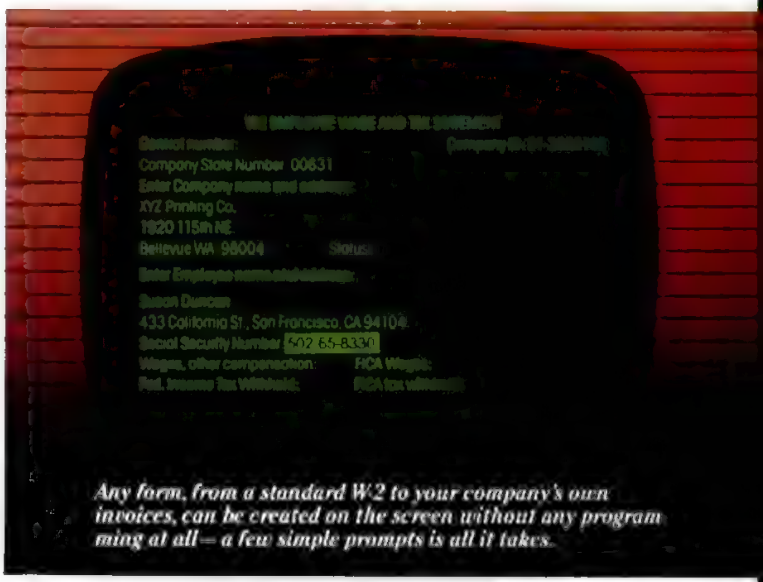
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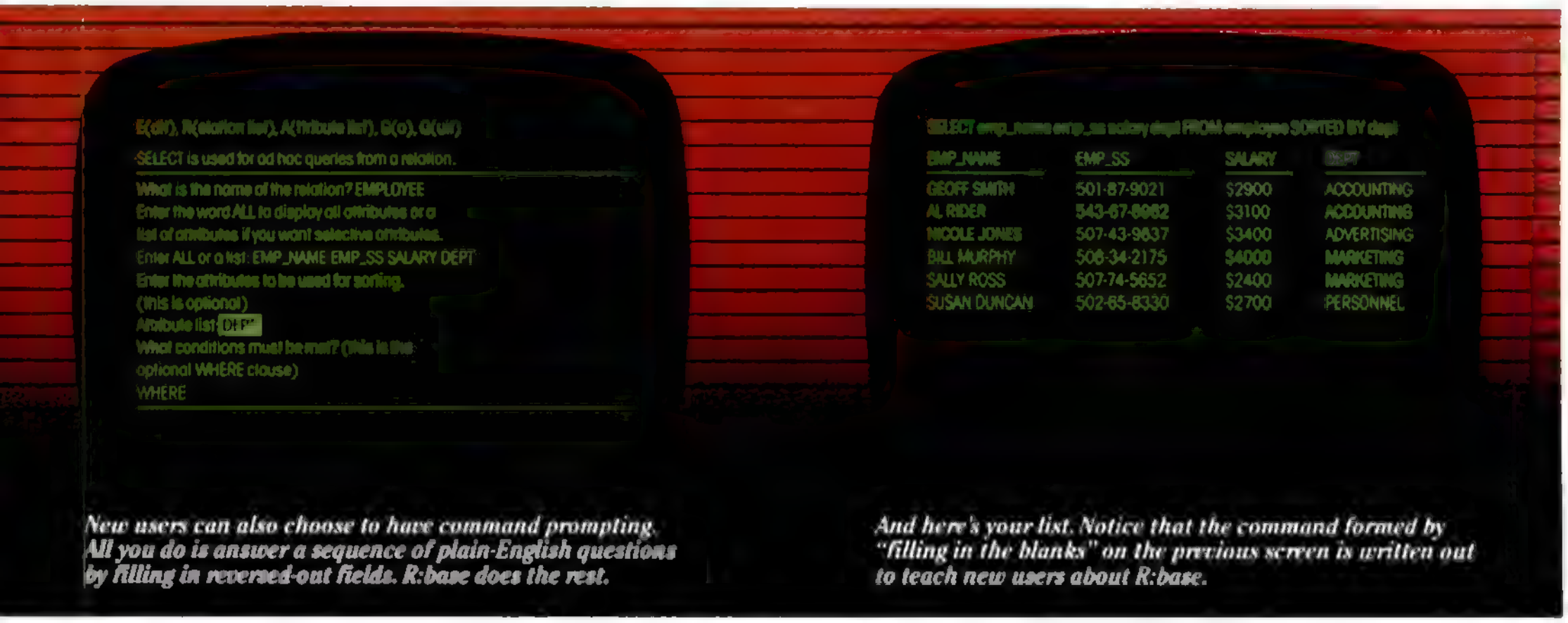
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dBASE II	65,535	2	32	5:47	No	$695
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*Sort 1000 records on 1 key value. (IBM PC with 256K and DS/DD diskettes)

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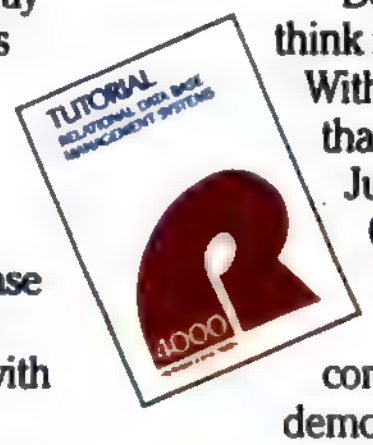
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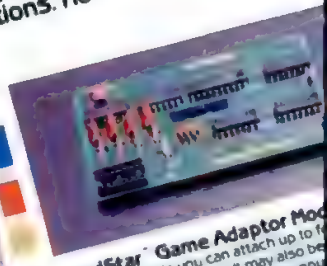
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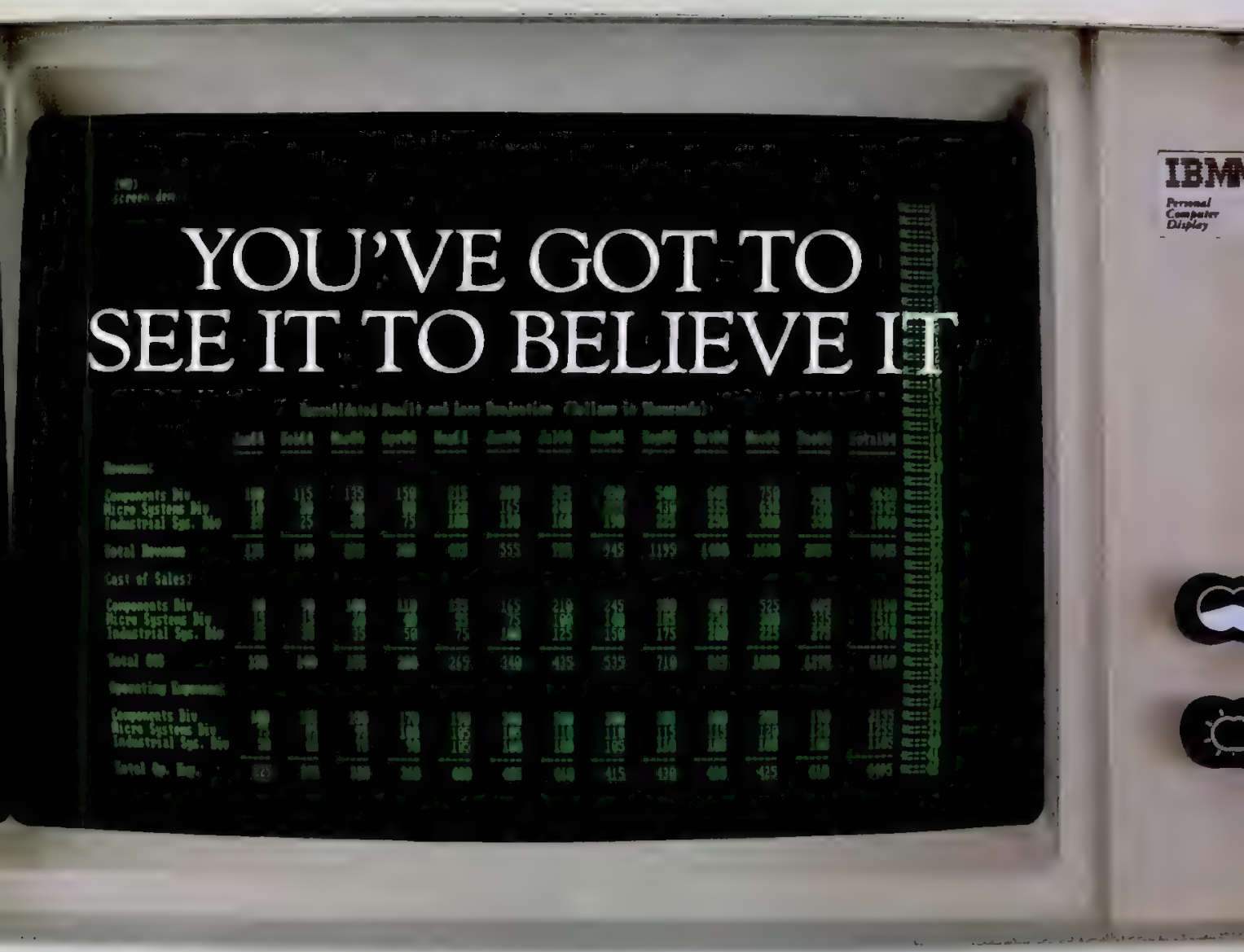
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IBM EYE/MARTIN PORTER

The powerful presence of IBM has changed a Florida town's fortunes and its nickname—from Fountain of Youth to Silicon Beach.

The Talk Of BOCA

"IBM creates the environment . . ."
from The Soul of a New Machine
by Tracy Kidder

The midnight traffic heading north on I-95 to Boca Raton sizzles at 85 mph. The engine noises are absorbed by the barren plain of palm trees, warehouses, condos, and billboards. Two of those billboards are emblazoned with enough wattage to light a night game at Dolphin Stadium. They have been carefully situated on both sides of the highway so that they are impossible to miss: "Isn't It Time You Moved To Boca?"

The billboards are adorned with the avant-garde logo of the real estate developer that has the most to gain from any such relocation—Arvida Corporation. This subsidiary of Penn Central owns Boca Raton's most desirable residential and commercial properties. Its holdings date from the early 1920s when no one in his right mind would have wanted to live down here.

People want to live down here now. This is southern Florida, land of the snowbird and retirement center of America. And, not so incidentally, one of the high-tech boom centers of the United States.

The clean and inconspicuous computer industry is setting the region's "fountain of youth" in motion. Those companies that installed whirlpools for arthritis sufferers years ago now are making a liv-



Newcomers to Boca Raton are greeted by a duo of floodlit, eye-catching billboards.

ing selling hot tubs. Though Red Buttons once brought thousands of retirees down from Brooklyn to Boca Raton with the lure of a $45,000 condo in Century Village, Arvida has its eye on bigger game—multinational corporations and their high paid executives.

Some people are starting to call the area Silicon Beach, in deference to the great valley of the West. Mitel, Siemens, Sensormatic, Harris, and Datamedix have all set up headquarters here. And, of course, there is IBM. Not just *any* IBM office building, mind you—the company is everywhere—but the IBM Entry Systems Division: the kingdom of the PC.

Undoubtedly, IBM's presence brought the high-tech copycats flocking to Boca. It was IBM that gave credibility to the hype issuing from Boca Raton's Chamber of Commerce. Arvida may own all the land, but IBM made it valuable.

Which IBM?

The late-night traveler to Boca will have a hard time finding the IBM compound. Not that it is hidden; in fact, it is right off the interstate. But there is nothing to draw your attention to the fact that the country's most profitable company has its most expansive profit center situated right under your nose.

A swing off the interstate in search of IBM turns into an opportunity for map-buying and tank-refilling at a Citgo station serving everything from unleaded gas to barbecued chickens. A teenaged girl behind the register counts out my change and doesn't look up when I ask the way to IBM. "Which one?" she replies.

It turns out that there are 20 IBMs in Boca Raton and the surrounding beaches of Delray, Deerfield, and Boynton. All are involved in some aspect of research and development, manufacture, and management of the Specialty Products Division and the Entry Systems Division, which recently gained full divisional standing.

BEFORE IBM, Boca Raton was undeveloped farmland supporting crops of pineapples and beans. The only residents were sharecroppers and Japanese farmers.

Long before the IBM PC brought the world's attention to Boca Raton, the company was here making minis. In fact, it was in Boca that the elephant first learned how to tap dance with its minicomputer market entry, the Series 1. Today, IBM employs 6,800 people in Boca, owns over 650 acres of land, and leases an additional 1.5 million additional square feet of office space. The company doesn't need to draw attention to itself (it doesn't even have a boldface listing in the local telephone book); everyone knows IBM is here. Before IBM, Boca Raton was undeveloped farmland supporting crops of pineapples and beans. The only residents were sharecroppers and Japanese farmers. Before IBM, all that Boca Raton had to brag about was a playboy's fantasy of the ultimate luxury resort: the Boca Hotel & Club. This 1920s building remains the architectural landmark of the city. But the structure that really deserves to be studied by those interested in the city is the corporate headquarters that architect Marcel Breuer designed for IBM.

In 1967, the year that IBM acquired acreage belonging to a Japanese farmer named Yamato (the facility is situated on Yamato Road), the firm of Breuer and Associates began construction on two Y-shaped buildings surrounded by a man-made lake. Breuer probably is better known for his chairs than for his buildings, but, as a founder of the Bauhaus school of design in the 1920s, he is regarded as one of the leading architects of this century. His buildings were the first to become part of the surrounding landscape. They made no spectacle of themselves.

Corporation of the Future

Breuer had an opportunity to test out his ideas on a grand scale when he was commissioned to build IBM's offices in LaGaude, France. The design was so successful that he was allowed to repeat it in Boca Raton. The theory behind both was that the corporation of the future would be more than just an office building; it would be an environment. It would be not only

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visually consistent with the landscape, but would also offer workers a retreat, with comfortable facilities in which to work and sufficient space in which to play.

The construction that Breuer built in Boca Raton has the solid, impenetrable aura of the Pentagon. The five-building complex has an architectural motif emphasizing soaring concrete columns. The grounds are lush, landscaped with black olive trees and pines rather than with native palms. The corporate dining room is evidence of Breuer's absolute control. When the building first opened, he wouldn't allow vending machines installed until they were covered with white, gray, and black vinyl to match the plant's color scheme.

Today, IBM has outgrown Breuer's buildings. Instead of expanding into the 500 additional acres it owns, it has preferred to lease office space throughout the city. One real estate agent told of a developer who built an office building with only one space commitment from IBM. By the time the building was ready to open, IBM decided it wanted the whole thing.

The environment concept that Breuer and other architects pioneered with commercial real estate has inspired Boca West, a self-contained residential enclave surrounding several golf courses and man-made lakes. There are no tract homes here. The average plot costs $250,000, and there are $3-million estates. The local BMW dealer does very well, thanks to the folks in Boca West.

Arvida built Boca West. You thought only the micro-compatible and software manufacturers were feeding off IBM? Businesses like Arvida have been doing it for years.

Arvida was the biggest employer in Boca Raton in the late 1960s when IBM first came to town. Its empire consisted primarily of one building, the Boca Hotel & Club, which was constructed during the Jazz Age and originally named the Cloisters Inn.

The Cloisters Inn was built by Boca Raton's founding father, Addison Mizner, a Palm Beach millionaire whose intent was to make the city the southern playground of the steamship set. At the time, the Inn was promoted as the most expensive 100-room hotel ever built. It cost $1.25 million. The money came from Mizner's Palm Beach pals with last names like Vanderbilt and duPont. The Inn boasted in an early ad: "I Am The Greatest Resort in the World."

Arvida, with 3,700 employees, remains the second-largest employer in Boca Raton. The company closed on 1,100 homes last year and accounted for over $235 million of Penn Central's 1982 earnings. The real estate firm's corporate pedigree dates back to its founding by Arthur Vining Davis (thus Arvida), former chairman of the board of the Aluminum Company of America (Alcoa). He once owned several

Left: Within Marcel Breuer's "corporation of the future," an environment for IBM employees to work and play in. Right: On the Boca waterfront, another playground for IBM employees.





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hundred thousand acres in the area.

Boca's Changing Face

Today, Arvida's emphasis is on industry rather than tourism. Its pet project is the Arvida Park of Commerce, an 800-acre industrial park exclusively for high-tech companies. The goal is to create a computer compound to rival North Carolina's Research Triangle. The Park of Commerce contains an 18-hole golf course, jogging paths, and lakes; it is conveniently situated directly across from IBM on Yamato Road.

IBM became the Park of Commerce's first tenant, and the company recently established its robotics headquarters there. The park, which closely resembles Breuer's IBM environment, is the first step in Arvida's plan to expand into 2,300 acres of untapped land to the north.

"The profile of Boca is really changing," explains Bob Ruf, Arvida's manager of marketing services. "Boca is getting too expensive for the retirees. It's probably too expensive for a lot of IBM employees. It is drawing a big professional crowd these days."

The high-tech firms are drawing that crowd, too. So are these Boca Raton Chamber of Commerce statistics: no state income tax; average income, $34,500; average home value, $161,000. Toss in that Boca is the winter polo capital of the world, has plenty of golf courses, good beaches and boating, and you can paint an alluring picture for an engineer who wants to unwind after a day spent with his head inside a microchip.

Although IBM has changed the face of Boca, the company's limited construction in the area has ensured its inconspicuous image. In addition, Breuer's original plan makes the corporate compound fit snugly into the landscape, and it is easy to miss the low-to-the-ground signs that announce the entrance and exits. But like any substantial newcomer, IBM took some getting used to.

In 1974, a local councilman proposed a two-fold ordinance that would limit IBM's expansion within the city limits in order to prevent overcrowding in the schools. In 1979, a lawsuit brought by environmentalists claimed that IBM's expansion was infringing on the area's original occupants, swamp rats and gopher tortoises. In both cases, IBM triumphed.

The company's future in Florida may recently have encountered its toughest opponent and one that may reduce substantially the rate of multinational corporate expansion in the area. In late June, 1983, Governor Robert Graham, a politician with an IBM PC on his desk, signed the Unitary Tax Law, passed several weeks earlier by the state legislature in Tallahassee. Modeled after the California assessment plan, which passed the scrutiny of the Supreme Court of the United States, this Florida tax package is aimed at gathering an extra $233 million in revenues for state schools.

Q: HOW do you maintain such tight security? A: Our employees know that the success of the company, and thus their jobs, depends on security. Apparently, they want to keep their jobs.

The law is expected to cost IBM an additional $5.8 million per year in taxes. According to Howard Davidson, general manager of the Boca Raton plant, "We couldn't just pull up and leave. But the state should know that the law will make us think twice about further expansion."

Running A Tight Ship

Davidson has been looked upon as the Boca Raton plant's leading authority since the ground-breaking announcement 15 years ago. It is he who impresses the need for security precautions upon employees; it is he who is writing an indignant letter to the governor about the Unitary Tax Law; it is he who represents IBM in more than a dozen community organizations.

Going to see him is like going to see anyone in the IBM complex. Each corridor is securely protected; entry is by pass-card only. Davidson's office is unassuming and comfortable, decorated with diagrams of ship hulls. His hair is whiter than it appeared in the early mug shots that accompanied the news reports about IBM's move to Boca in the late 1960s. His answers to my questions are straightforward.

Q: How much did IBM pay for the land back in 1968?

A: *About $3,000 per acre.*

Q: What is it worth today?

A: *About $250,000 per acre.*

Q: How has the PC affected the operation down here? For example, how much have you grown because of the new product?

A: *IBM doesn't give out figures like that.*

Q: Is the company involved in local politics?

A: *We'll lobby about issues we feel strongly about, but we don't get involved in party politics.*

Q: Why does IBM keep such a low profile in town?

A: *We don't want to be flamboyant.*

Q: How do you maintain such tight security?

A: *Our employees know that the success of the company, and thus their jobs, depends on security. Apparently, they want to keep their jobs.*

Q: You seem interested in community activities. Have you donated any PCs anywhere in Boca?

A: *IBM doesn't donate its equipment.*

The PC Goes to School

IBM did give some PC's to the schools of Boca Raton, though the verb *donate* might not quite apply. While complaining about the new state school tax, IBM also seems eager to learn how the Personal Computer can fit in to the local secondary schools. Besides, the fact that nearby Broward County schools have become Apple country serves as a constant reminder of IBM's late start in the micro game.

The high schools of Boca Raton were selected by the Educational Testing Service in Princeton, New Jersey to be part of an IBM-sponsored national experiment in PC high-school training. In New York, California, and Florida schools, the $8 million program is training teachers to use PCs. Each school receives 15 computers and a wide range of software. It is up to the educators to figure out what to do with the equipment.

The teachers at nearby Florida Atlantic University, who are in charge of the local PC training institute, are excited about the opportunity. Project director Dan Kauff-



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man explains, "My impression is that IBM is seriously concerned about education in this country and decided it was time to do something about it."

In a classroom that has been converted for teacher training, Art Mitchell, head of the science department at nearby Atlantic High School, is busy tweaking a question in a biology exam he developed using *pfs File*. He too lauds the opportunity IBM has give him, but adds, "IBM is going to get a tremendous amount of information in return for their investment. IBM doesn't do something like this for nothing."

THE PC rolls off the assembly line just outside of town, but that doesn't mean you'll find units with their prices slashed.

Bargain Hunting

IBM doesn't give Boca residents any bargains, either. The PC rolls off the assembly line just outside of town, but that doesn't mean you'll find units with their prices slashed. In fact, because of the company's distribution network, it actually may take you longer to get a PC in Boca than it would in Burbank.

Take, for example, IBM employees who are eager to get involved in home, 16-bit tinkering. Each employee is allowed a 40 percent discount on a PC, which, for a while, was fulfilled through a nearby ComputerLand. The very workers who insert the boards had to wait for their units to leave Boca for the dealership warehouse in California and then return.

There are six authorized IBM PC dealers within a 10-mile radius of the IBM site. Jim Couch, who manages one of these dealerships, The Computer Center, explains that his PCs are first sent to Kentucky before they are shipped back to his customers here. He can offer no better than a 5 week wait, a lament common to PC dealers throughout the country.

"I'd say that 50 percent of our business comes from IBM employees," Couch says. "Some of them even have Apples. Obviously, you have the very knowledgeable ones and then you also have those who don't know a thing about computers."

What about the IBM engineers? What is it like to sell to somebody who already knows everything there is to know about the PC?

"To tell you the truth," he remarks. "I wouldn't know what any of my customers do at IBM. They don't talk about it." IBM people like to keep a low profile in Boca Raton. */PC*

For Members Only

There are two PC user groups in Boca these days, but only one has an open membership policy.

Until last summer, there was only one IBM PC user's group in Boca Raton. That was the most famous user's group of all, the one limited to IBM employees, but this exclusive gathering is as verboten to outsiders as the IBM corridors are without a magnetic strip pass card.

It is not snobbery that keeps the group closed; the members just don't want to let anything slip. They are likely to be answering the user questions for products that haven't even been announced yet. Besides, the group is regulated by the same code of confidentiality that characterizes all IBM employee relationships within or without the city limits.

A typical encounter with an IBM employee at a Boca Raton cocktail party goes something like this:

"So where do you work?"

"IBM."

"Oh yeah, what do you do?" Silence. You might as well hit the wall during the Boston Marathon: the conversation is over.

The silence that IBM has been able to inculcate in its employee population is staggering. Not long ago, when computers were considered dull stuff that nobody really understood anyway, the questions were few, limited only to neighborhood stock market speculators. Today, everyone wants to know what is going on with the PC. They want to know about the Peanut and whatever else the company is getting ready to roll off the assembly line.

The fact is nobody knows any more about IBM in Boca Raton than they do anywhere else. It took two years for an outside PC user's group to get up steam here.

At a roundtable discussion, several members of this new, 60-member PC conclave talked about IBM, life in Boca, and especially what it is like to be a PC freak in the shadow of the beast.

"It's probably no different than anywhere else. Sure I know more people from IBM, and I might know a quicker way of finding things out. But, otherwise, there isn't much of a benefit," says a software developer in the group.

"That's not really true," counters someone else. "If you listen closely, and if you are good at putting two and two together, you can pick up a clue here and there."

Another voice: "I have a friend who told me, 'If you decide to buy an IBM PC during the next six months, I'll only let you know if you should or should not go ahead.' "

Yet another person adds: "I told a friend of mine that I was getting ready to buy an XT and he gave me one word of advice 'Don't.' "

Lines of communication have opened between the users faction and their neighbors on the other side of the IBM fence. In fact, the members relate that the IBM employees have been going out of their way to help the group get started.

"Our hope is to become a main resource for PC user's groups throughout the country," says group leader Wyatt Bell. "We don't know everything, but at least we are closer to the source." —M.P.

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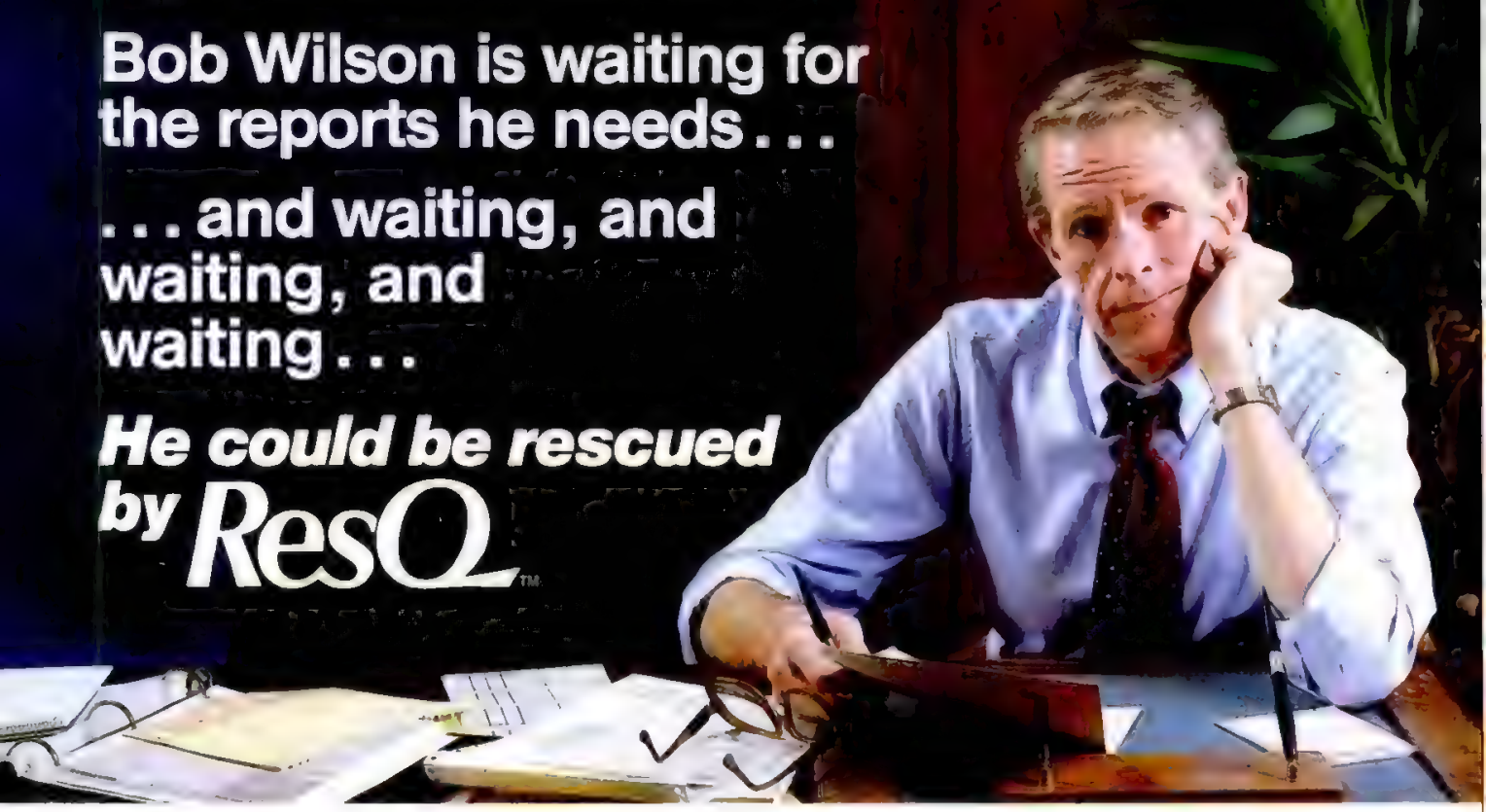


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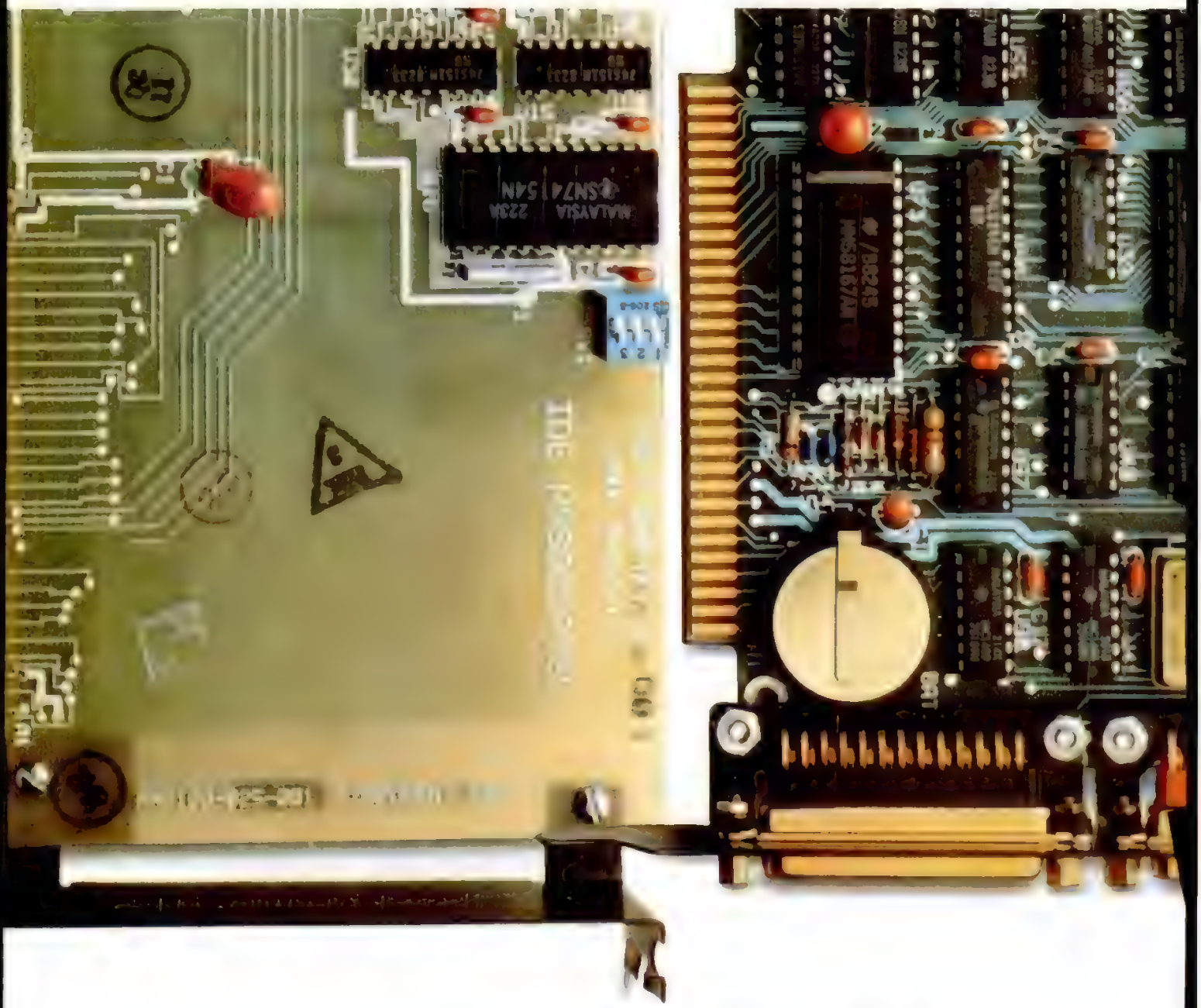
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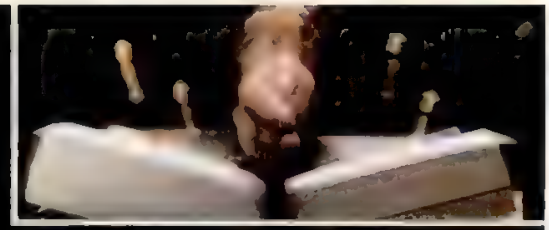
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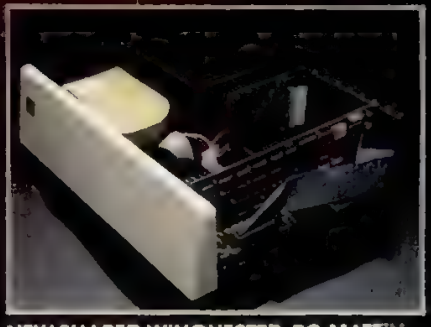
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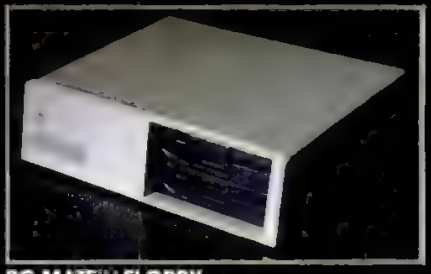
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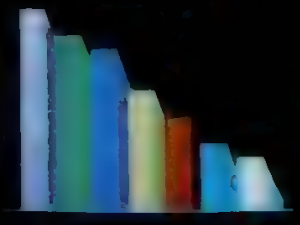
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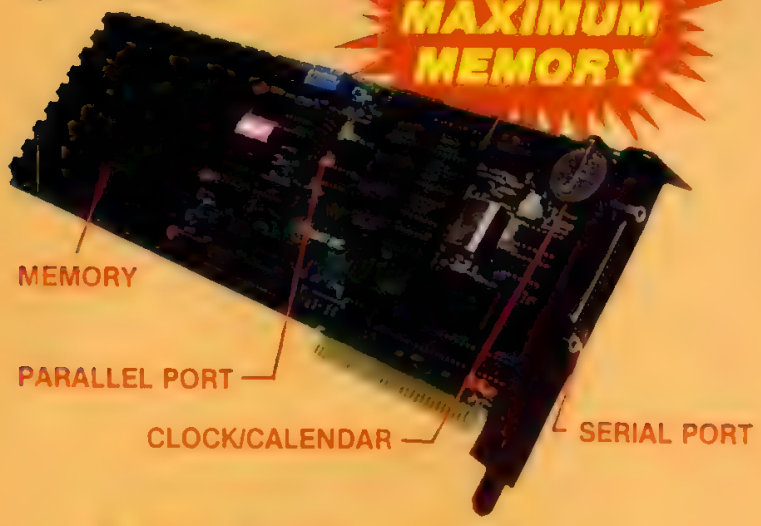
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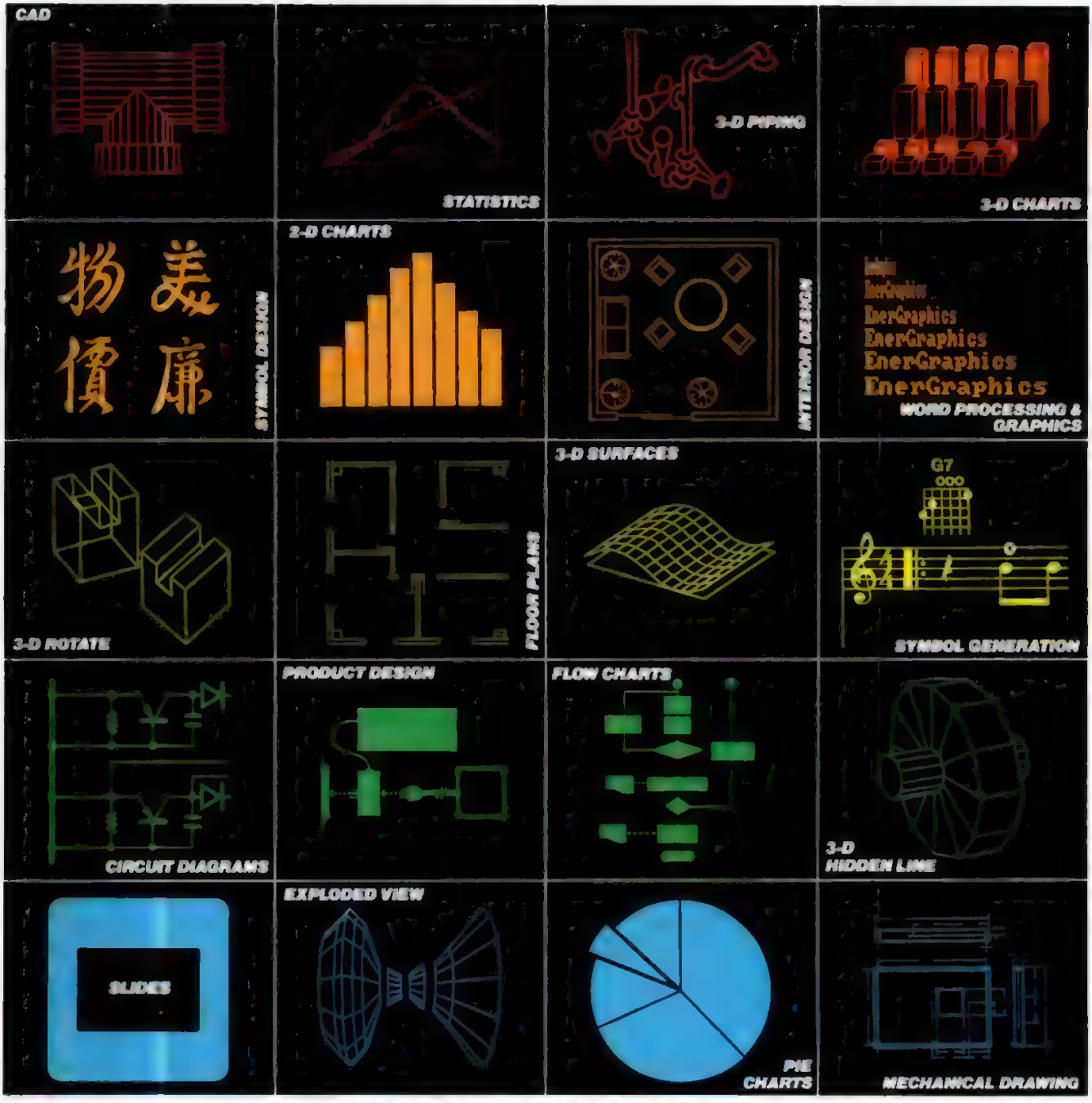
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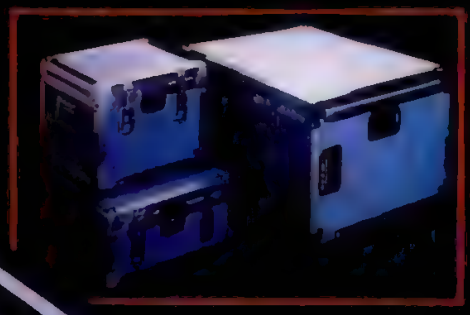
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The author with the IBM 5100 family. From left to right: the SCAMP, the 5100, the 5110, the 5120, and the 5150 Personal Computer.

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IBM EYE/PAUL J. FRIEDL

IBM has been called a latecomer in the micro-business. In reality, Big Blue invented the personal computer 10 years ago—a little before the world was quite ready for it.

SCAMP:

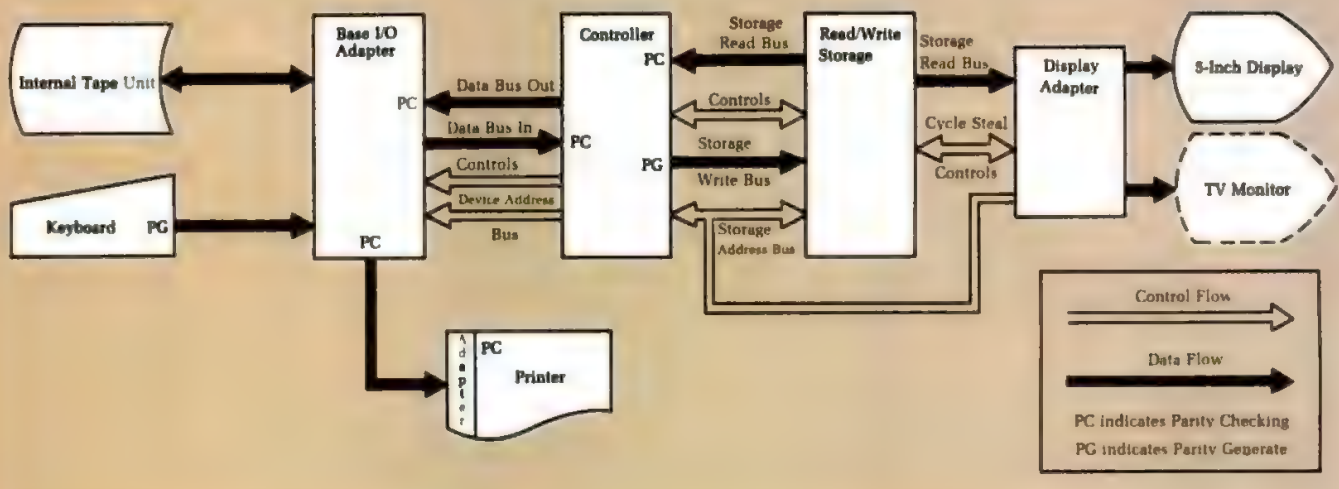


The Missing Link In The PC's Past?

The year 1983 marks the tenth anniversary of a milestone in the history of computing—the creation of SCAMP, the world's first personal computer. On this occasion it seems fitting to recall SCAMP not only as an IBM project and as a device, but also as a revolutionary concept.

Webster defines revolution as "a sudden, radical, or complete change" and evolution as "a process of continuous change . . . a progressive development." By these definitions, it appears that the concept of SCAMP was indeed revolutionary, whereas its realization as a device was evolutionary.

Figure 1: A diagram of the architecture used in the SCAMP.



During the heyday of centralized systems in the early 1970s, it was a radical change to consider building a system that could be operated by a single user, rather than requiring multiple users to approach a common shared system—one that rarely had sufficient ports, storage, or computing capacity available.

The notion of bringing computers to people was stimulated by several key trends at that time. Integrated circuit technology had become sufficiently advanced; high-level programming language technology had combined with interactive computing techniques to form systems such as APL, a very popular and powerful progamming system. Why not combine these technologies into a portable personal computer that would free a user from some of the constraints of time-sharing systems?

The SCAMP Project

In January 1973, I presented IBM management with a design for SCAMP (Special Computer, APL Machine Portable) and a project plan to develop a prototype system. Afterwards, in Atlanta, Georgia, Jack Rogers, President of IBM's General Systems Division at the time, commissioned me to lead a project with the ambitious goal of developing a SCAMP prototype in 6 months. I had agreed to lead a fully-funded project to develop a revolutionary concept into a working prototype in a very short time, but I didn't have any people or resources to work with. Was I mad? (Moral: You should always be prepared to take yes for an answer.)

Good fortune smiled down on this project throughout. Within the first 2 weeks, enough people with the needed skills were borrowed from other IBM groups to staff a hardware team in the IBM Advanced Systems Development Laboratory in Los Gatos, California, and a programming team in my laboratory, the IBM Scientific Center in Palo Alto, California. We were also fortunate to have as team leaders our Chief Engineer, Joe George, and our Chief Programmer, Patrick Smith. These teams took the concept and formed the hardware, microcode, and software into the SCAMP prototype that we delivered on schedule to IBM Atlanta 6 months later.

I HAD agreed to develop a revolutionary concept into a working prototype in a very short time.

An Evolutionary Device

The architecture of the SCAMP system was quite conventional, as is shown in Figure 1. The short time available for development meant that the system had to be built from existing hardware and software components as much as possible. The thing that was new about SCAMP's hardware was its packaging—this unprecedented design has proved to be a missing link in the evolution of the personal computer. SCAMP represented a significant physical design departure from the systems at that time, in 1973, even though all of its components were quite conventional. Solid state technology then permitted sufficient compactness to allow the circuit cards for a microprocessor, 64 kilobytes of read/write memory, and device control logic to be packaged in the same frame as a CRT display, keyboard, and tape cassette drive. To make the system truly portable, all of the components were mounted in a set of covers, giving the unit the appearance of a small piece of luggage. This package is shown in Figure 2.

To operate the system, you placed the unit on its side, slid open a hatch cover, and popped the system into its raised position. A new high-frequency switching power supply was being simultaneously developed, but was not finished in time to be integrated into the system. Instead, a conventional standalone power supply was used throughout the SCAMP project.

The major system components were already available from various sources. For example, we selected a 5-inch CRT from Ball Brothers, Inc. for our display; a Norelco audio tape cassette recorder for a secondary storage device; a keyboard from IBM in Raleigh, North Carolina; 16 KB

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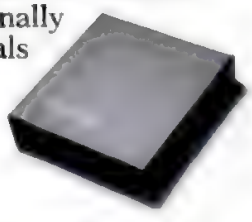
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memory cards from IBM in Germany; support cards from IBM in Endicott, New York, and a PALM (Put All Logic in Microcode) microprocessor—not a chip, but a single board—from IBM in Boca Raton, Florida. (The insides of the SCAMP and a production model 5100 are exposed in Figure 3.)

The necessarily short development time had a similar effect upon our software plans; we knew we could not afford to develop a new APL language processor from scratch. The solution was, therefore, to emulate a processor for which a suitable APL system already existed. With this as a strategy, we chose to write an IBM 1130 emulator in PALM microcode so we could "plug in" almost all of version of APL that was available for the 1130. In this way, we were able to replace a programming effort of several person-years with one of several person-months.

ONCE YOU have a personal portable APL machine, what do you do with it?

What Is a Personal Computer?

While our hardware and program development teams blazed away at their respective activities, I had a chance to work on several other problems and questions. Once you have a personal portable APL machine, what do you do with it? How should applications be presented to the user? How could SCAMP best be handled as a product? How could I get these concepts across to IBM management?

To the first question there were several answers. You could use SCAMP as a super desktop calculator, as an interactive APL programming device, and as a "dispenser" of canned application programs. Use as a calculator, though interesting, was not in itself persuasive, because the cost of the system seemed to far outweigh the value of this usage. SCAMP's use as an APL programming device was much more appealing. The SCAMP, however, had to be sold to IBM's high level management: executives who were not, in general, experienced APL users. It seemed that my best shot was to demonstrate SCAMP's capabilities in the third area—as an application machine for non-programmers.

I believed that the computer should always direct interaction with the user by presenting questions along with the form

Figure 2: The original SCAMP folded into its suitcase-like frame (see inset). The upper part of the SCAMP, including the monitor, pops up when the system is to be used.





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of possible expected answers, or a multiple choice menu. In addition, I felt it quite important to have a HELP facility that could be invoked at any time. Figure 4 shows the contents of the main MENU screen that I used when demonstrating SCAMP to IBM's management. This menu lists the types of applications that I believed might best suggest the wide capability of such a machine to my audience. Some screens demonstrating the HELP function and applications appear in Figures 5 through 7.

In spite of these efforts to prepare ways to show how easy SCAMP was to use, how could I be sure that an audience composed of inexperienced users would get this vital message? The solution hit me like a thunderclap—I would make my audience of managers operate the SCAMP hands-on! This may seem obvious, trivial, or old-hat to you now, but let me assure you that this was a revolutionary approach at the time. Many of my "victims" had not had recent typing experience, much less hands-on computing or programming experience. When demonstrating SCAMP to various IBM executives, I had no notion of how much pressure I'd be putting them under by asking them to execute what seemed to me to be a simple demo. Here I was, insisting that they perform tasks that they had never done before, in front of their peers. (I hope all of these fine people have either forgotten or forgiven me.) The outcome, however, was superb—there were no system failures and my new set of no-longer-inexperienced users performed beautifully. I knew we had arrived when one of the executives said, "Gee, anyone should be able to do this."

There were still a number of challenging questions that needed answers. How should such a product be mass produced? How should it be marketed, installed, and maintained? IBM's traditional methods and services, that support the larger computers, did not apply here. Thus, as part of the SCAMP "package," a number of new approaches were proposed, including customer installation, machine problem determination by the user, and IBM retail stores. All of these approaches are, of course, commonplace today.

MY BEST shot was to demonstrate SCAMP's capabilities as an application machine for nonprogrammers.

The Sons of SCAMP

As some of you may know, SCAMP soon became known as the IBM 5100 portable computer. This compact, standalone computer was announced to the world by IBM's General Systems Division on September 9, 1975. The initial prices ranged from $8,975 to $19,975. Succeeding generations were called the IBM 5110 and 5120 systems.

These machines were used in laboratories and universities; in medical, real estate, and insurance offices; even in drug stores, lumber yards, automobile showrooms, and cattle ranches. One joined the crew of an oceanographic research ship. Another accompanied President Nixon on his first trip to the People's Republic of China as a special "technical emissary." The 5100s went places computers had never gone before.

Now we have the IBM 5150, IBM's Personal Computer. The striking similarity of

Figure 3: The insides of the SCAMP (left) and a production model of the IBM 5100 (right).

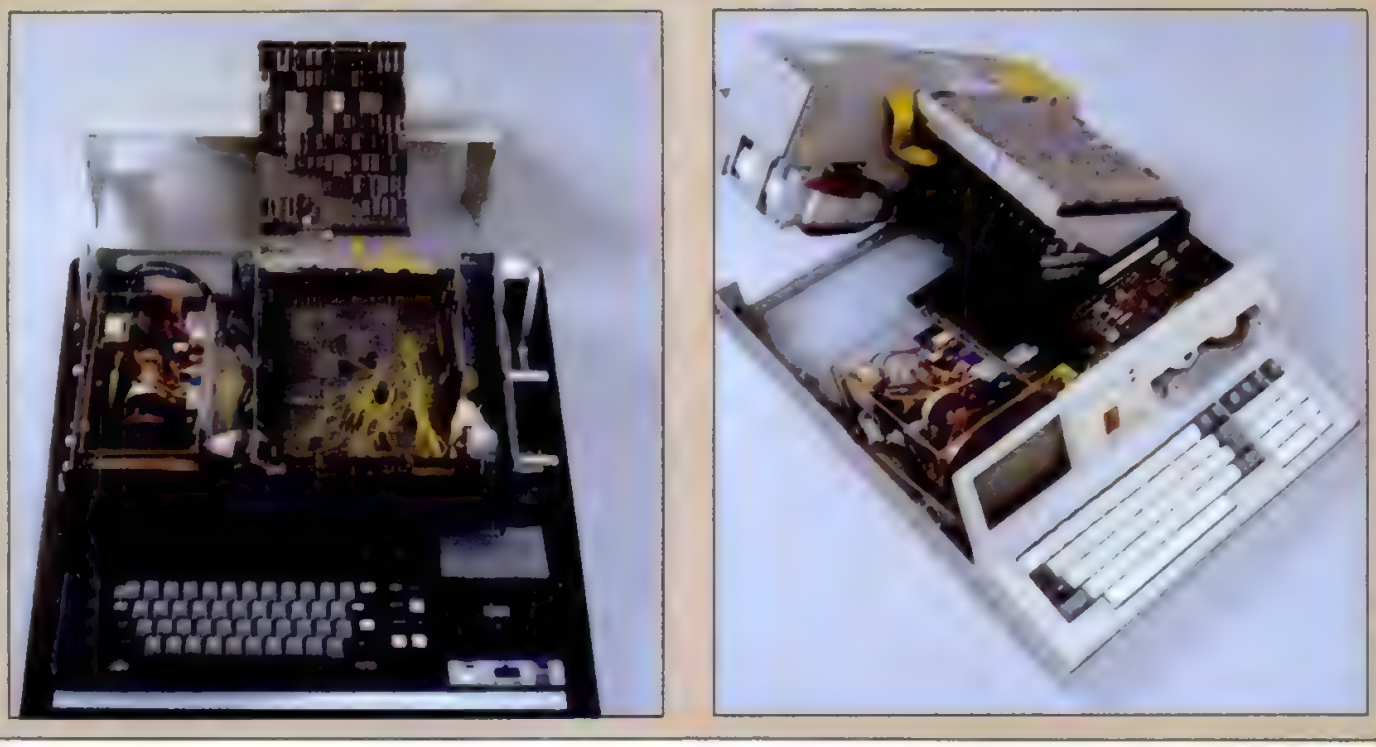


Figure 4: The *MAIN* menu of the software used to demonstrate the SCAMP, listing six options.

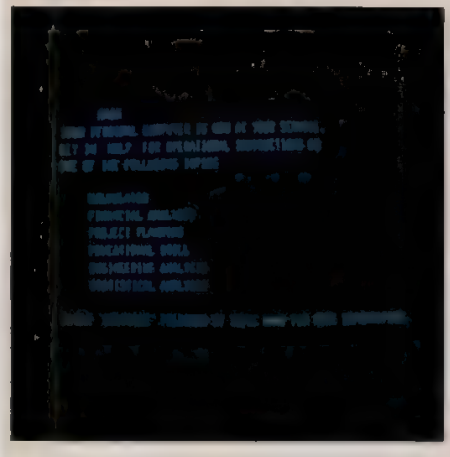


Figure 5: An explanation of the Project Planning option appears after entering "DESCRIBE PROJECT" on the fourth line of the screen.

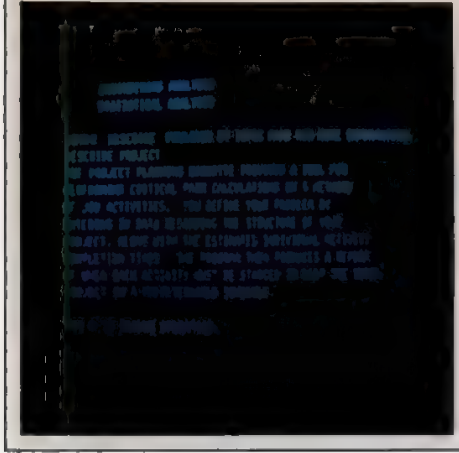


Figure 6: The Calculator option has been called up; an explanation and an example appear on the first screen.



Figure 7: The Calculator software in use, to answer four questions about the series of numbers entered under BAL.



most of today's microcomputers to the SCAMP—as well as to each other—might make one wonder if this vein of computing has already paid out. I submit that we are witnessing not the beginning of the end to the personal computer's progress, but the end of the beginning.

Just as SCAMP introduced a revolutionary concept with an evolutionary technology 10 years ago, its descendants will themselves evolve and combine with other technologies. Thus, worldwide communications networks, knowledge-based systems, and voice processing will join with personal computers to form exciting new generations of systems designed to plan, advise, teach, play, and communicate with users everywhere.

Who are the users? SCAMP met the users, and they is US! */PC*

Paul J. Friedl is Manager of Exploratory Systems at the IBM Scientific Center in Palo Alto, California. He is involved with projects involving knowledge-based systems and with microprocessor applications for process control, laboratory automation, and local area networking. He is a senior consultant in these fields and has a Ph.D in Chemical Engineering from the Case Institute of Technology in Cleveland, Ohio. *The author wishes to acknowledge the following for their contributions to the development of the SCAMP: Roger Abernathy, Warren Christopherson, Doug Dean, Ed Finnegan, Dick Flagg, Jerry Garvis, Joe George, Al Ginsberg, John Greenfield, Roy Harper, Paul Hodges, Dell Hollenbach, Jerry Jarvis, Phil LaVeau, Joe Ma, George Marenin, Art McCarthy, John McPherson, Joe Myers, Dave Nielsen, John Opel, Kitty Stark Price, Dennis Roberson, Jack Rogers, John Rood, Dave Slattery, Patrick Smith, Lou Stevens, Greg Tobin, Bill Tutt, and Virgil Wyatt.*

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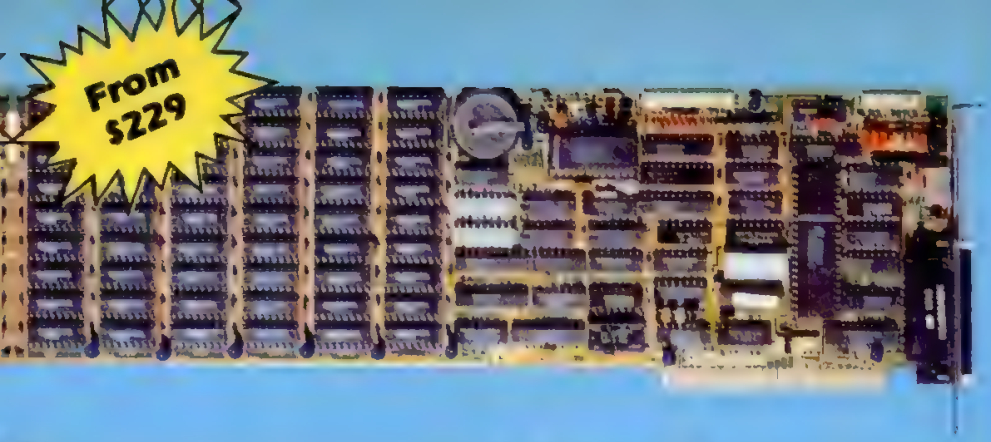
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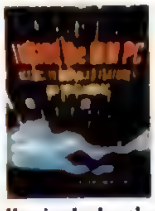
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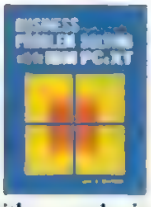
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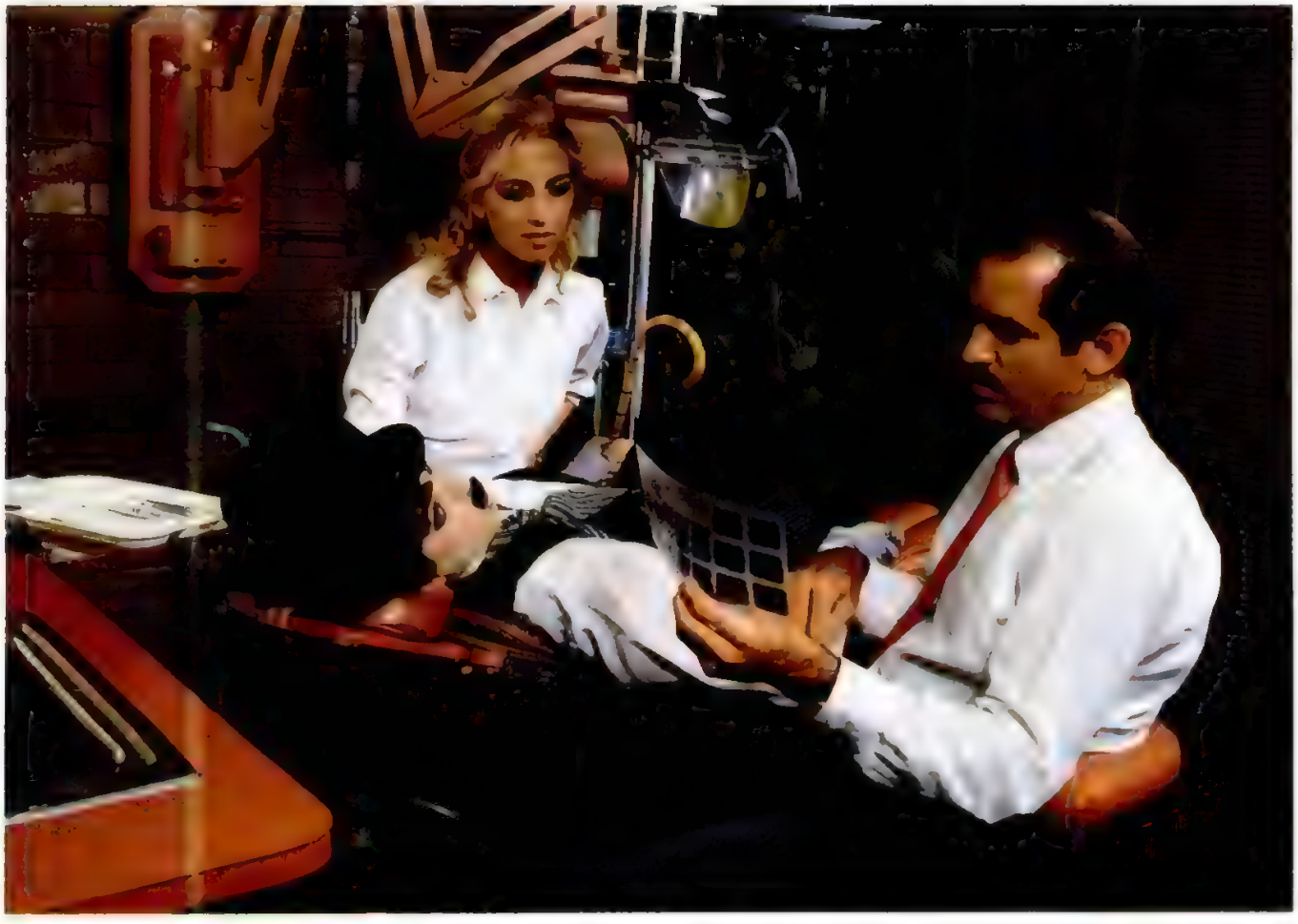
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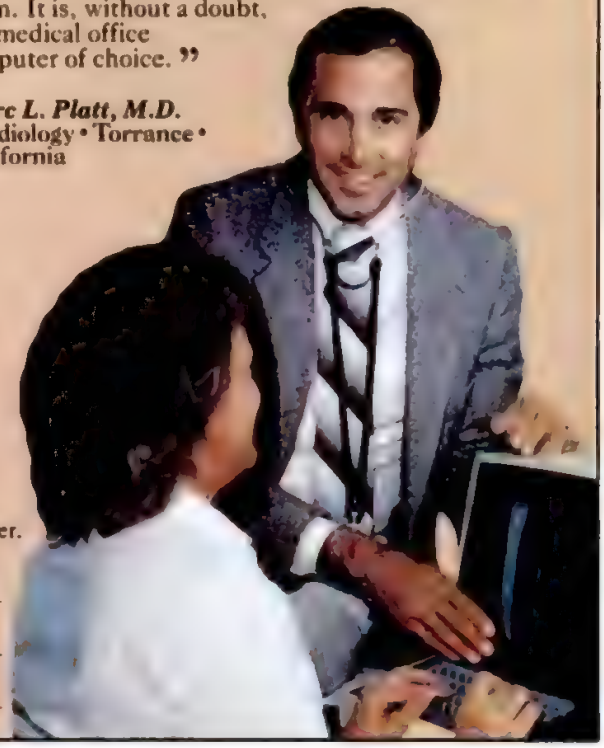
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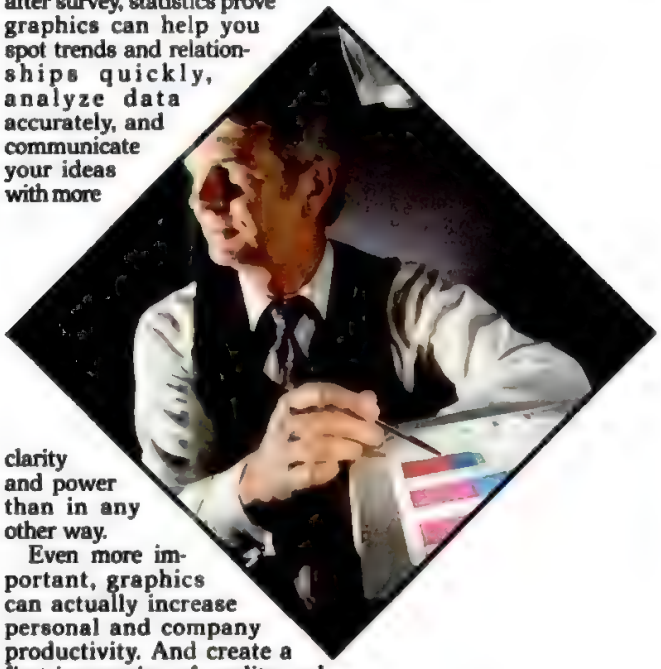
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Now, with the new HP 7475A Business Professional's Plotter, your meetings can have immediate and productive results like these.

How the quality look of HP graphics can help

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Your choice: 2 paper sizes and today's most popular graphics software packages

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can be the key to your success.



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CIRCLE 306 ON READER SERVICE CARD

Other programs continue to flood the market, but WordStar remains the world's number-one word processor. Here are some reasons why, along with some news on MicroPro's splashy next release.

Why We Like WordStar

Two issues ago, technical editor Bill Machrone spoke of the satori attained after proper installation of an 8087 chip. Not to go holy on everyone, but for me, it's *WordStar* that is truly Zen-like. Why?

I contemplate an empty screen. My mind is devoid of all thought, which doesn't bode well considering the deadline for this article was last week. A small bell rings. It is not the clarion call of a distant Shinto temple. There is a subscriber on the phone who wants to know where he can get a DOS 2.0 tutorial on building a PC fish scaler. He swears he saw one written up in *PC* that interfaces with *Lotus 1-2-3*. When I convey my skepticism, he asks instead for instructions on running a Trident submarine via his RS-232.

I focus on the great distance between us and touch a key. A pattern of dots forms on the monitor. It is being refreshed 30 times a second. I, on the other hand, am not being refreshed at all. I meditate on this for several hours, while wrestling with a lead sentence that sounds as if it had been scribbled by a hypoxic Sherpa after his first English lesson halfway up K2.

Then, in a clear and transcendent moment, a phrase flows effortlessly into my consciousness, down my arms, out my fingers, onto the keys, onto the screen, and then off again, out into the electronic trash can, the big bit bucket, in one long chain.

I'm not saying I do a lot of revision, but my function keys allow me to delete text in virtually every way possible—by the letter, by the word, by the line, left or right, up or down; with my amazing word processor I can now trash the entire piece in a mere second or two. This is much faster than the pre-electronic method of dispairingly ripping a sheet of paper out of the typewriter platen, crumpling it in a rage, and arching it over to the corner of the room where it will hit the side of a wastebasket and settle on the floor among its many cousins.

One Hand Typing

Perhaps my blood is hungry for sugar. With fluid movements I reach into a handy bag of cookies. The carbohydrates wrap themselves around me with a cloying buzz. A feeling of energetic stickiness throttles into my brainpan and I hammer out a solitary sentence. Then silence. Another cookie, another sentence. This is a blissful noise: fingers rustling in cardboard for a chocolate chip and the sound of one hand typing.

Soon, however, the mystical spell is broken, as the horripilating visage of the managing editor fills the doorway. When I



Our first date!



Surprise!

Valentine's Day!





A toast!



At the beach.



Her birthday!

A day at the arcade.

Our favorite restaurants!

tell him I am reflecting on the koanlike, beatific qualities of word processors, he points out that unless I redouble my efforts, the issue is going to go to press with five blank pages bearing only the legend "from a friend," and that if the piece is not completed posthaste he is going to insert my yin and yang where the sun don't shine.

Once we've achieved this metaphysical understanding, the words fairly tumble out onto the screen. It's quite astounding what a little terror can do to kick the flywheel over. And when the sentences start cascading across the synapses, there's no better way, in my opinion, to pin the wriggly little devils down than with *WordStar*.

No, that's not a misprint. We'd be lost without *WordStar*. There are others out there; a recent tally listed 44 separate packages that billed themselves as word processors (including three that are multilingual for those who dream of having writer's block in more than one language), and another 18 as text editors. Not that these other packages are bad, mind you. Some, like *FinalWord*, or *MultiMate*, could go a few rounds with the MicroPro Marauder, but most of the others would take a dive at the opening bell.

Pork Plantation

The *PC* offices are a software junkie's dream come true; each day the Federal Express man staggers in the door shouldering a heavy Santa's sack of new releases. We stand around the pile distractedly opening the cartons while singing our own version of "What the World Needs Now" as yet another database, spreadsheet, *Pac-Man* imitation, or word processing package tumbles out.

Now, we're the first to admit that *WordStar* has a quirk or two. It's not easy to master; you don't see ads showing a delighted user hammering away at the keys saying "15 minutes ago I had never touched a keyboard and now I'm doing column moves like a pro." Well, actually, you may. MicroPro's slick little brochure on the product boasts "even an inexperienced typist can sit down with *WordStar*, learn a few basic commands, and then quickly turn out perfect memos and letters. *WordStar* is that easy." Right. And pigs grow on trees.

Well, okay, maybe it isn't so simple. I remember some pretty confused moments when I had the manuals out in front of me for the first time. "You hold down *what*?? You have to hit this and this and this and this just to do that?" But now, after several months, my left pinky can diddle the Ctrl key like it was born resting on it. And between the cursor pad keys like Home and End and my customized *WordStar* version 3.3 function keys, I can virtually take fast dictation from my brain and get it down clean, first pass. Of course the nice thing about any word processor, and *WordStar* specifically, is that it's so easy to go back and fix and paste and change once you have something on a disk.

Sure, it would be nice if *WordStar* had a buffer so that if you accidentally deleted something you could resurrect it. And while we're at it, separate buffers for search-and-replace (^QA) and find (^QF). And about 20 more function keys would come in awfully handy, each spitting out more keystrokes than the paltry six you get now. (See Janice Keefe's sidebar on the synergistic magic of *WordStar* and *ProKey*.) Onscreen italics and boldface would be a plus, as would spiffier reformatting of indented text.

But now you can run the thing in color. And it's memory-mapped so that it flies, compared to the older versions, especially when you're running on a RAM drive. And there are some truly wonderful touches. How many word processors can handle column moves, horizontal scrolling, hyphenation, and complex print-formatting options to beat the band? And fit handily in 64K? And include enough dazzling standard features to give dedicated word processors a run for their money?

Inscrutable Commands

WordStar's menus are simply the best anywhere. Of course, you have to know how word processors work—what they're capable of doing—and which cryptic *WordStar* commands perform which kinds of textual legerdemain. MicroPro tries. To mark a block of text, you slap a ^KB at the beginning of the block and a ^KK at the end. You should see what this double boldfacing looks like on the screen

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CIRCLE 153 ON READER SERVICE CARD

(and you can in Figure 1). As Corey Sandler points out, such lines cry out for a ^OD to erase the hodgepodge of carets and inscrutable embedded commands.

What's especially nice about these menus is that once you see how everything works and learn the many features offered, you can shrink the amount of space they take up on the screen. Some other word processors permanently waste almost a third of the screen with their prompts, status lines, warnings, borders, and geegaws. With *WordStar* you can reduce all this clutter to one unobtrusive line at the very top. (Version 3.3 offers a function key description on the 25th line, but contributing editor Steve Manes discovered a way to lop that off too. See "WordStar 3.24 And 3.3: MicroPro Does It Again ... And Again," PC, Volume 2 Number 1.) If you do need the menus while you're learning, you can park them onscreen in several different configurations.

WORDSTAR's menus are simply the best anywhere.

It really doesn't take very long to learn the commands you'll want for everyday use. *WordStar* has dozens, but some, like column moves—while powerful and exceedingly nifty to use—just aren't called for very often. When you do need these exotic commands, you can pop the menu onto your screen and figure out which key to tap. Most of the users around the office, except the real old-timers, rely on the second level of menus. This way, the lists of choices normally don't appear on your screen, but will scroll down quickly when summoned.

If you really prowl through the documentation (which is tough for the vast number of users with bootleg copies; *WordStar* is not copy-protected) you can discover some of the less well-known commands that can make operation simpler. A good example is ^R, which repeats the last name of a file you've entered. If you're editing and copying and renaming and printing and deleting, you can save numerous steps by entering ^R at every name prompt after you've typed it in once.

Diamond Hard

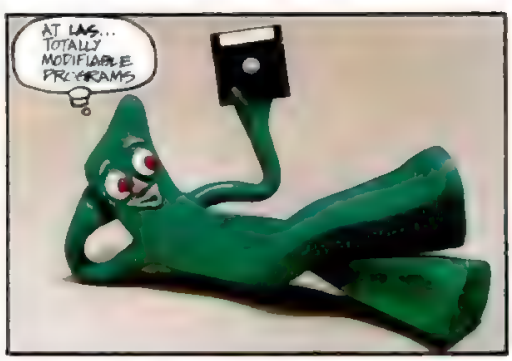
Most of the office old-timers cut their *WordStar* teeth on CP/M machines. You can spot these computer senior citizens instantly because they prefer the "diamond" of command letters adjacent to the Ctrl key, rather than such refinements as IBM's cursor-pad stroke-savers. They'll forego PgUp, Home, or Ins for the less efficient Ctrl+R, Ctrl+Q+E, or Ctrl+V—but this is just further proof of how ingrained and automatic *WordStar* gets.

It also means that once you learn the accursed CP/M commands, you can use *WordStar* on just about every micro that's out there. I can walk over to some balky new water-powered boutique machine with a proprietary op system and unfathomable documentation, and if I can somehow get *WordStar* loaded, I can type happily away until the cows come come.

Since *WordStar* has to manage all necessary file handling for all types of hardware, there are times when PC-DOS utilities are far speedier. Steve Manes and I both like to use *WordStar* on a RAM disk. Try slogging through a 60 Kbyte file on a floppy; the wait seems eternal. On a disk emulator it's lightning quick. Steve created a simple batch file to use rapid DOS copy routines rather than *WordStar*'s chuggier ones. He saves and exits (using ^KX) and then uses miracle DOS batch files with replaceable parameters to create the copy and then reload *WordStar* and the proper file at the same time. (You can do this by appending the filename when you invoke the program.) His batch file is shown in Figure 2; to use it, simply enter the program, name it "W.BAT", then type in: W FILENAME (substitute your own filename). Tip: You can create batch files using *WordStar* rather than with the DOS COPY CON: command. If you have enough memory, you can load *WordStar* on one RAM drive and keep your files on another. (If you do this however, you'll have to change the batch file slightly.)

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And because it runs on so many machines, it's become the unquestioned standard. Writers who send us *WordStar* files are doing us a big favor; we can noodle around with the prose if we need to, without any trouble, then pop off hard copy in minutes. We tear our hair out, however, when someone foists a foreign disk on us with the absurd caution, "It's a semi-DOS file." Who could invent such a thing, and why? This means untold anguish deciphering what's on the floppy while guessing how to get it to talk to our text editors and printers. Fortunately, *WordStar*'s "search-and-replace" feature is so good that it can spin such straw into gold.

The search-and-replace utility also comes in handy when you're writing or debugging programs. Sure, there are special program editors around that have one or two better features, but if you want one text processor for all your needs, you just can't get your hands on anything else that will measure up. And its related "find" utility is perfect for jumping to a certain place in your text, or checking on how recently you've used a certain word, or seeing what you said about a subject earlier in the document. What makes this especially handy is that you can easily mark where you were before you started your search, then jump right back with two keystrokes after you've found it. These two features also make child's play out of going back afterwards for editorial corrections and additions.

Here's a nifty search-and-replace trick that's been around for years: If you have to type a book title or a firm name or a long serial number several times in one file, you could just abbreviate and go back later and search/replace the real thing; everyone knows that. But you'll probably have to reformat the entire document, since such repeated substitutions invariably unbalance the right-hand margin. And let's face it, if you have anything other than vanilla margins, *WordStar* can be downright awful when it rejustifies.

Instead, use the search and replace feature *as you write*. Type in ^QA, and when it asks what you want to find, just hit the Enter key without typing anything else in. When it then asks what you want to replace it with, type in the long repetitive phrase or number and hit Enter. You're essentially telling it to replace nothing with a hard-to-type something. As soon as you hit the second Enter, hit N since it will ask if you want to do a replace right away. Then each time you want to type the long phrase, just type ^LY instead, and voila—it flashes onto the line in the proper place. I'm doing this myself with the word *WordStar*—a tough word on the fingers with its front and back italics markers and its central capital letter.

WORDSTAR's search-and-replace feature is so good that it can spin such straw into gold.

Best Patch Around

WordStar does have one dreadful flaw. The command to kill a word to the right of the cursor is ^T. But the command to wipe out the entire line is ^Y. You may have noticed that these keys are right next to each other. And since *WordStar* does not have a buffer that can unerase something you've just deleted, you can excise an entire line when you're just trying to rub out a short word or even a single mistyped character.

There is a solution, however, and we don't know how we ever got along without it. For a mere $50, you can get your hands on the *WordStar* customization notes (MicroPro slashed the price from an absurd $500 a year ago). While this tome will never replace Flaubert or Perelman, it does make fascinating reading. The only problem with it is that it's not IBM-specific enough. But with it, you can switch keys around, create your own menus, drive oddball printers, and toggle all sorts of interesting features on and off. A careful reading told us that all commands have the potential to be two keystrokes long. So



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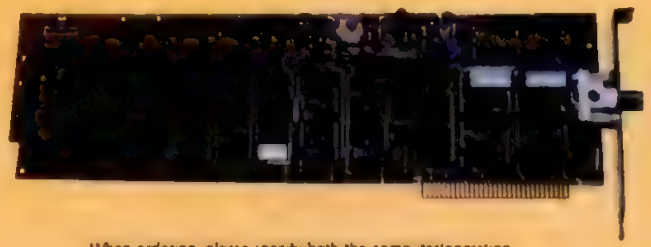
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we looked up the memory address of ^Y and changed one little byte so that you now have to hit it *twice* before you do any damage. Hit it once by mistake and you can squirm out just by tapping the spacebar. (See Figure 3 for detailed instructions.)

That's another thing we admire: *WordStar* is generally very forgiving. Screw up with some other word processors and you're dead. But with *WordStar*, you can usually just hit ^U—short for "uh oh"—then Esc and you're safe. If you fry a file to a fare-thee-well, you can quit it gracefully and start over. Under the worst circumstances, there is always the automatic backup file *WordStar* created when you dove into the original to butcher it up.

The program tries hard not to let you screw up in the first place. Type an inappropriate command and *WordStar* is likely to ignore it. For instance, when you first boot WS.COM, there are only several letters you can enter that will actually do anything. Hit one that's not on the menu and *WordStar* will just sit there twiddling its thumbs. Or if you hit some crazy command like ^(while editing, you'll get the same unresponsive answer. Some other word processors will take the big flush when you try something untoward like that.

Finally, when you do make a big mistake, it's invariably simple to fix it with block moves in and out of previous versions and temporary files. The exception is the dreaded "disk full" catastrophe, but even this has become no big deal, since there are now several ways to crawl away with at least most of your work intact. Saving to disk often, dividing your files up into small, workable sections, and using disks that aren't cluttered with garbage are all good ideas that will head this off at the pass. But if you do end up with a full disk and an unsaved file, you can either delete old files from the disk while still in *WordStar*, or use the clever trick described by Randy Bennett and Roger Kershaw (See "Fast Recovery From WordStar Disaster," *PC*, Volume 2 Number 1.)

Fingers Never Leave My Hand

According to John Schnell, general *WordStar* expert and *PC* contributor: "One reason I use it is that it was the word processor I learned first. I've tried a few others, but I keep coming back to *WordStar*. One of the reasons is that what you see on the screen is what you get when you print it out. Having everything run under the control commands is also important—your hands never have to leave the home row. Word processors on other machines are very indirect—you have to step through a number of menus or drop down a level from the document you're working on to give instructions to the program.

"I'm so far beyond it that by now *WordStar* is totally automatic and internalized. It's hard to learn but easy to use. You find that out when you try to teach other people how to use it. One thing that really surprised me after I used it for a while is that all the information—the commands

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and classifications of commands—are in the menus. They're really well thought out, but you don't appreciate this until after you've learned how to use them. And, it is a more than adequate editor for writing and debugging programs."

From Steve Manes: "The single best feature of *WordStar* is that you can perform every function it has to offer without ever breaking your concentration by leaving your text. It also seems to have anticipated all the important aids that weren't available when it was developed—keyboard enhancers, hard disks, RAM disks and the like. Now if only it would do windows."

Technical editor Bill Machrone adds: "I like *WordStar* because I've known it cold since CP/M version 0.92A. I've tried others but they either didn't have the sheer number of features or weren't really as easy to use once I learned them. For instance, there are many multimode word processors out there that are a pain in the neck, since it seems you're never in the mode you want to be in. In *WordStar* you're in command mode *and* text mode all the time—there's no distinction.

WHAT you see on the screen is what you get when you print it out.

"MicroPro has continually upgraded and improved the product, and was first on the market with a lot of important features, including some blockbusters that a lot of packages still don't offer, such as column moves. I've taught a lot of people how to use *WordStar* and have found that most people think the basics are fairly simple to learn. This is probably because I always ask myself when instructing a new user: 'Which 40 percent of *WordStar* do I have to teach this particular person?'

Undocumented Features

"It's exceedingly flexible, and there are a number of undocumented features. I use proportional spacing to give an occasional business letter a professional appearance. There's a switch inside the software that changes the microjustification algorithm; I use that just to make my documents look different. I've patched *WordStar* for color terminals and 60-line terminals, used various sets of function keys, and have used it to drive everything from relatively featureless teletypes to Spinwriters. It handles all of the arcane print enhancements and handshaking specs with ease.

"*MailMerge* is not the single most powerful extended formatter on the market. *Spellbinder* and even *Peachtext* have logical or looping capability that is absent in *MailMerge*. But *MailMerge* is easy to understand and use, and it gets the job done. Where people don't use it and should

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is in doing really simple things, like printing multiple copies of a document, or automatically inserting the date into all your correspondence, or queueing chapters of a book. And it also has a host of dot commands that either override or expand the normal print formatting of *WordStar*."

> ***THE number-one problem reported by most users is that WordStar is hard to learn.***

Okay, we all agree it's not perfect. And you do need to exploit your function keys if you want to crank out any real speed. The arrangement we use around the office is shown in Figure 4. *ProKey* and *WordStar* are an ideal mix. Any version of *WordStar* earlier than 3.3 doesn't make it easy to customize your function keys, but there are programs around that will do this for you (John Schnell wrote a particularly good one for the premier edition of *PC Disk Magazine*.)

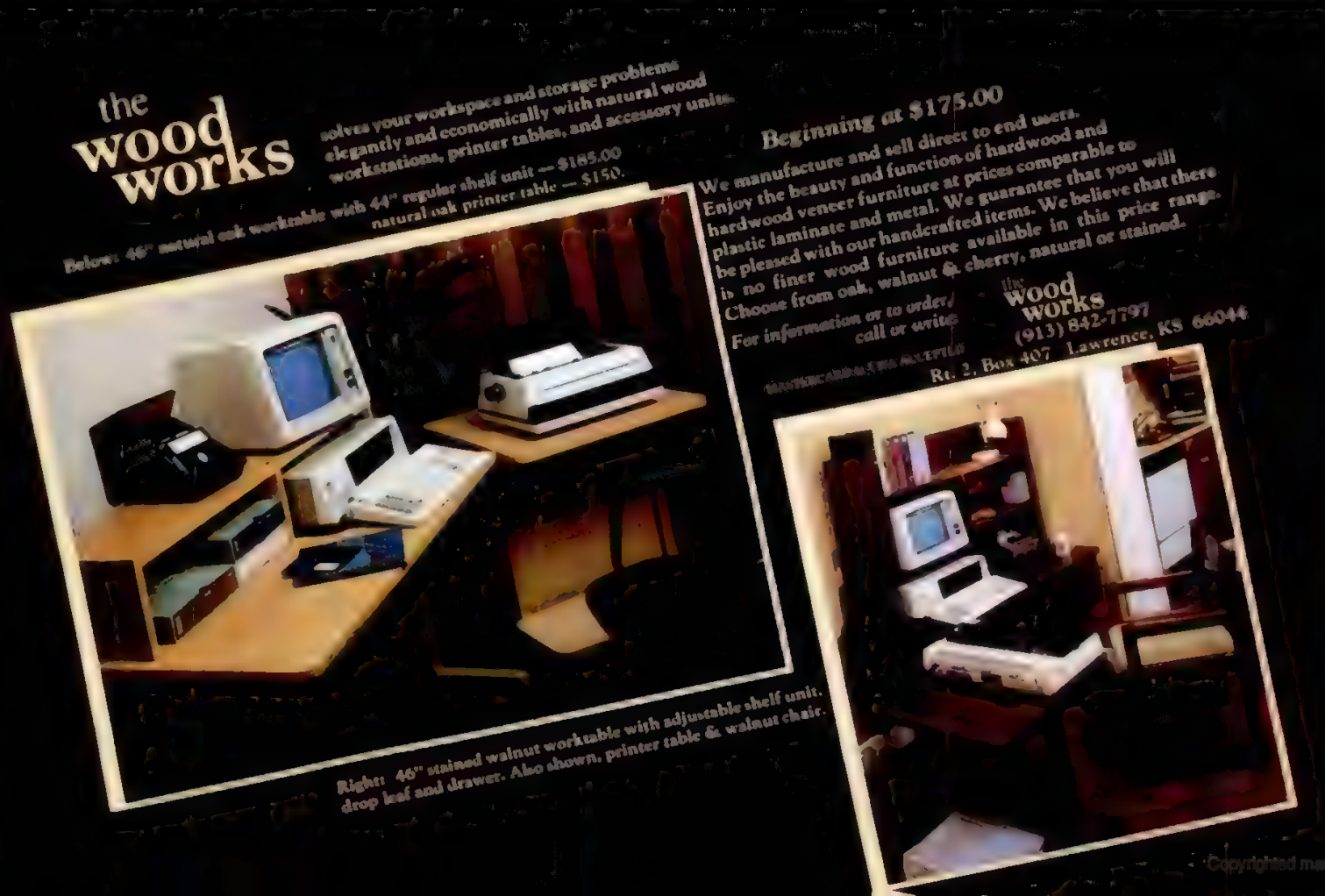
Future WordStar Enhancements

We recently spoke with MicroPro's *WordStar* product manager, Ken Walsh, about the product's future. Walsh confirmed that new releases would be written in C rather than 8086 assembler as is done now, and discussed some of the features we might be seeing in future editions. Like everyone else in the intensely competitive micro biz, he punctuated every sentence with the standard disavowals, caveats, gainsays, disclaimers, and traversals. So, for the record, the following enhancements are simply features the company is researching. Hmmmm . . .

The number-one problem reported by most users, Walsh claims, is that *WordStar* is hard to learn. In response, we should expect to see several instructional aids in the not-too-distant future. New end users may soon be trying out their control codes on a floppy interactive tutorial. Businessmen, on the other hand, will learn from new MicroPro "multiple tools" packaged to teach entire classes at one sitting, perhaps with laser disks. Walsh says he'll have cold-start first-timers banging out memos and short letters in the first hour of instruction.

The specific enhancements are enough to make any *WordStar* user's mouth water, but Walsh cautions that they won't be immediately available. Heading the list is true proportional spacing, which the program can actually do fairly decently in its present incarnation if you know the secret code. Not far behind is paragraph reformatting that will retain indentations and eventually be done automatically so that you don't have to go back and type ^B—or even ^Q^Q^B—each time.

MicroPro engineers are also restructuring the system of mnemonics to group commands in more logical families and



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make them easier to remember. Walsh admits they are "a little fragmented under the present system." Whether this means we'll have to relearn codes is not clear. Future versions of *WordStar* will have math capabilities to perform calculations on tables of figures, and perhaps more.

New printers are flooding the market, and *WordStar* is rapidly being configured to handle them. And there may be more sensational features. Windows are being given serious consideration, according to Walsh, although as he points out, since *WordStar* now runs under Concurrent CP/M, you can switch adroitly back and forth

Sandler's Secret Ingredient Word Processor

Executive Editor Corey Sandler redefines WordStar.

Executive editor Corey Sandler, who paces a lot when he's searching for the muse, sometimes stops strangers in the hallway to sing "Ode to OD" or a "Paean to ProKey."

"To begin with," he'll tell you, "I don't use MicroPro's *WordStar* at all. It's a real pain. What I use is *Sandler's Secret Ingredient Word Processor*. MicroPro is merely a supplier for me, an OEM, if you will."

What's inside his word processing stew? *WordStar 3.3*, without the status line at the bottom (removed with Steve Manes' Debug change. See "WordStar 3.24 And 3.3: MicroPro Does It Again . . . And Again," PC, Volume 2 Number 1); with Paul Somerson's magic Control Y antidestruction device; and with a full set of *ProKey* modifications to every function key and a few regular character changes as well.

"The very first thing I did with *ProKey* was to trash *WordStar*'s illogical assignment of the delete key on the PC. I want the delete key to take out the character immediately above the cursor. So I redefined the delete key as Control G.

"Then I redid all of the function keys. Every one of them has a new assignment—

between it and a database. But how many PC users are going to switch to CP/M? How many fingers am I holding up?

The new *WordStars* will probably support page-by-page footnoting, widow and orphan protection, expanded function key use, and multi-line headers and footers. And rather than the current welter of embedded commands, future releases will likely have a better system of displaying such print enhancements as underlining and boldfacing. You may instead see such highlighted sections in reverse video or high-intensity text onscreen. And you'll be able to jump to specific pages, some-

you can read about them in my review of *ProKey* (See "Doing It Your Way With ProKey," PC, Volume 1 Number 9). My favorites, though, are:

- F1: Set line spacing to double, turn off hyphenation, turn off justification, remove the ruler line at the top of the screen, and dispense with all of the help screens (Control OS2; Control OH; Control OB; Control OJ; Control OT, and Control OH1).
- F2: Save and Return (Control KS).
- Alt F2: Save and go to menu (Control KD).
- Ctrl F2: Save, go to menu, enter print menu, call up name of last file, skip over irrelevant queries, and begin printing. (Control KD; P; Control R, and Escape.)
- F3: Underscore (Control PS).
- Alt F3: Begin underscore, accept copy until carriage return, then complete underscore.
- F4: Super boldface (Control PD, Control PB).
- Alt F4: Like Alt F3, an automatic open and close boldface command.
- F5: Reformat a paragraph (Control B).
- Alt F5: Reformat everything from below the cursor to the end of the page, and then return to this point for further instructions (Control QQB1, Control QP).

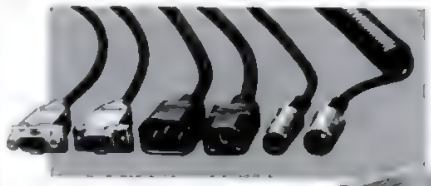
There are more tricks in Sandler's bag—enough so that no one else on the staff is fully able to use his adapted *WordStar*. They include things like automatic header set-ups, pre-set letter formats, and secret words and passages that only he can understand. (That's one way he manages

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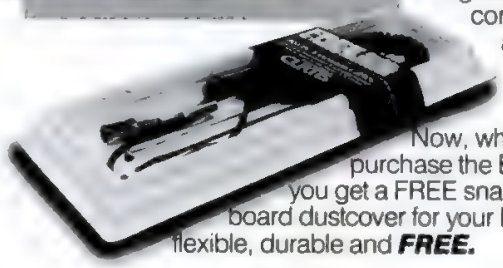
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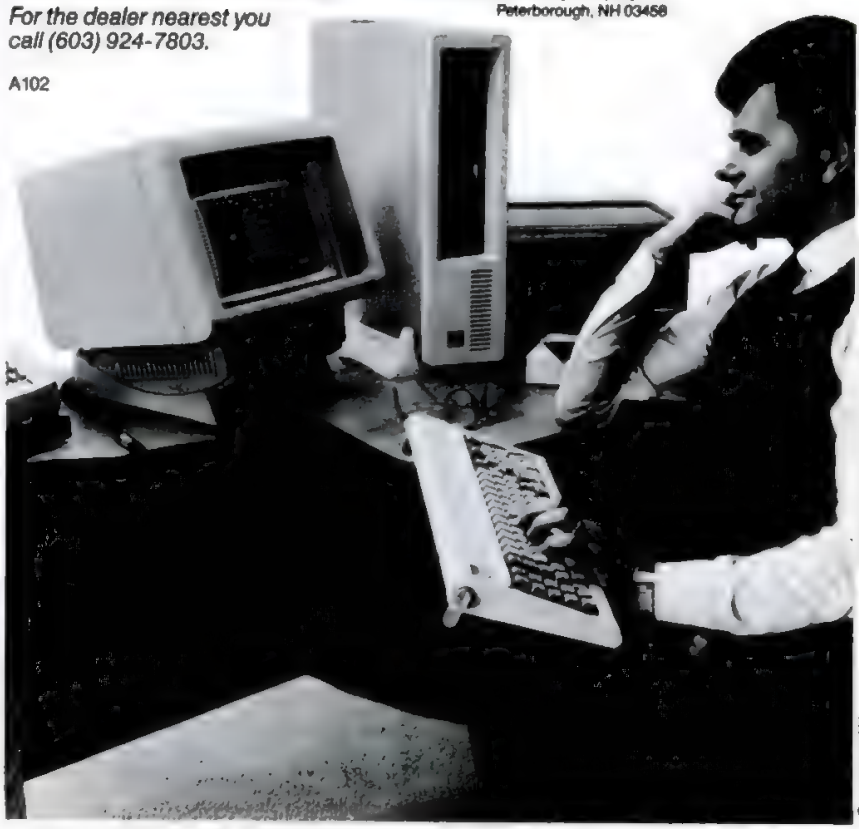
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thing you can't do now.

You should soon be able to delete to the following punctuation mark, as well as deleting forwards and backwards to the beginning and end of a paragraph. The onscreen prompts almost certainly will be expanded and enhanced. And way down on the list is keyboard-controlled onscreen graphics. Not all of these enhancements may make it onto the disk right away, and the next release is not expected in the immediate future. But it won't be in the year 2000 either.

Walsh hinted that future editions may be released with different levels of com-

to keep stragglers from sneaking in and using his machine when he is out pacing.)

"One other thing I do is to leave ProKey available to me for short-term macro programming while I'm writing," Sandler said. "For example, just for this article I assigned Alt W to become a temporary special key to save typing: It types out an underscored *WordStar* with one combined keystroke. When I exit the program, that assignment is gone. Next time Alt W might stand for the Polish version of *VisiCalc*. What more could a guy want?"

Sandler answered his own question a minute later as he began humming a few bars to the "Ode to OD" (lyrics to the tune of "Ruby"). One of *WordStar*'s virtues is the fact that it lets you know that you have called for boldface by showing a ^B on the screen; for double printing, by leaving a ^D; for underscore, by displaying ^S; and a few other special characters. One of its most annoying quirks is that the *Ss*, *Ds*, *Bs*, and other characters can run into copy, making it at best, difficult to read. The other problem comes if you are trying to line up copy for a table or for special indents in your copy. It is not easy to find the correct position for characters with all of those control marks floating around.

"Enter Control OD and your problems are at an end," Sandler rhapsodizes. "The garbage disappears, your columns line up, and all is well with the universe. Unless, of course, you forget to put in a closing underscore, boldface, or double print mark, in which case your printer will have a different kind of 'O-D.' "

—*Janice Keefe*

plexity. After all, most people don't begin to tap even half the power of the present package. A financial expert who needs to add columns of numbers and a secretary who types standard business letters and a footnote-heavy scholarly author all have different needs.

IBM On The Bandwagon

MicroPro has sold "600,000 straight packages," according to spokeswoman Jan McGowan, making it the best-selling word processor in micro history. She adds that the single best-selling format in recent years has been for PC-compatible hardware. IBM is even selling it now.

Walsh says the figure is actually approaching one million, worldwide. *WordStar* is distributed in ten languages in 28 countries, and runs on 60 or more different machines. And MicroPro is not stinting its efforts in other areas—they're crowing about their new 20,000-word Houghton-Mifflin *American Heritage* spelling checker, as well as about *StarIndex*, the can-do utility that creates tables of contents with up to four levels of subentries, creates alphabetized indexes, creates lists of figures and tables, indexes across different files, inserts blank pages where necessary, tracks page numbers through additions and deletions, chops, grates, slices, rices, and dices.

MicroPro still doesn't want to get involved with end-user complaints, and they charge a bundle for updates (currently a whopping $85 each for *WordStar*, *MailMerge*, and *SpellStar* 3.3) but they seem to be making an effort to keep users happy. The ghastly, incomprehensible manuals of the past have been replaced by attractive, better-organized, illustrated, halfway breezy ones that fit neatly on your desk in IBM-sized slipcases. The new installation program takes a while to huff and puff your way through, but is awfully chummy, often asking you to verify a change three or four times. And they even give you little gaily colored keytop stickers in addition to the old reference card.

Look, I admit there is room for improvement. I would like to be able to plug a database or another file into a window and move text down into my document with the touch of a key. The high-bit characters at the end of each word are an occasional problem, but the world out there is accustomed to them and in most

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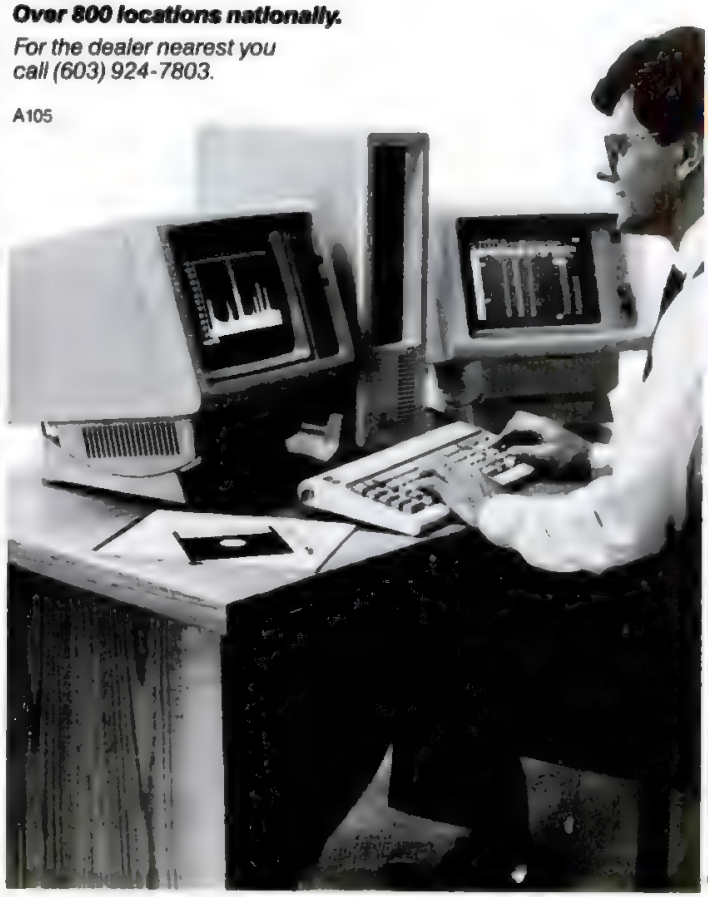
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Figure 1: Thicket of unsightly control characters needed just to double-strike and boldface four single letters in a sentence.

To mark a block of text, you slap a ^K^D^BB^D^B at the beginning of the ^D^Bb^D^Bloc^D^Bk^D^B and a ^K^D^BK^D^B at the end.

Figure 2: Batch file that lets you keep your WordStar files on a RAM disk (C:) and save them to a floppy (B:) using the much faster DOS COPY utility rather than MicroPro's.

```
WS C:%1
PAUSE
COPY C:%1 B:
%0 %1
```

The pause in the second line lets you quit when you're all done by hitting Ctrl-Break and then answering the "Terminate batch job (Y/N)?" with a Y.

Figure 3: Instructions for changing the ^Y delete command to ^Y^Y:

1. *Put your DOS disk in drive A: and WordStar in drive B:*
2. *At the "A>" prompt, type in: DEBUG B:WS.COM*
3. *At the "-" prompt, type in: E 536 (and hit ENTER)*
4. *The screen should respond with: 00*
5. *Type in: 19 (and hit ENTER)*
6. *At the next "-" prompt, type in: W*
7. *Finally, quit at the next "-" prompt by typing in: Q*
8. *Then run WordStar and make sure you have to hit ^Y twice before it will erase a line. After you type in the first ^Y it should park one at the upper left-hand corner of the screen. Hit the space bar and it will go away. But hit ^Y again and the current line will vanish.*

Figure 4: WordStar function key settings used around the PC offices.

F1 ^KS^QP (Save and return to current position)
*F2 ^F (Jump one word to the right) **
F3 ^A^T (Delete one word to the left)
F4 ^T (Delete one word to the right)
F5 ^P^S (Underline)
F6 ^B (Reformat)
F7 ^QS (Move cursor to beginning of line)
F8 ^QD (Move cursor to end of line)
F9 ^QR (Move to beginning of file)
F10 ^QC (Move to end of file)
**Note—F2 jumps a word at a time to the right. To jump to the left, you still have to hit ^A, but since the A key is next to the Ctrl key, it's the easiest Ctrl combination on the keyboard.*

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cases has already made provisions for the necessary stripping. Part of its formatter is in the misnamed *MailMerge* and not in the program itself. I could use about ten or twenty more function keys and a directory with more information—filesize, date, free space on disk, etc. And it still has a raft of annoying little habits, such as

IF

Shakespeare had owned WordStar and a PC, he would have polished off a dozen more plays.

thinking two words separated by a dash are actually one very long word.

But 3.3 is quick and sleek, and lets me do virtually everything I need without any heartache. Nothing else comes close. In fact, I can now write several times as fast as I could before I discovered it, since I can simply leap in and start typing, then do the inevitable block moves, hatchet edits, and amplifications later so quickly and cleanly it makes my head spin. If Shakespeare had owned *WordStar* and a PC, he would have polished off a dozen more plays. Think about that. It really does help turn writer's block into writer's cramp. When you put out a 700-page magazine, a fast word processor with top-drawer editing capabilities like *WordStar* comes in awfully handy.

Actually, what I really want is Tecmar's new voice recognition equipment configured for *WordStar*'s editing commands. It works like a charm. Tecmar has been using voice-recognition *WordStar* internally for some time, and hands-off editing is truly astonishing—if you don't mind being seen barking commands at your PC. "Down!" "Right!" "Reformat!" I love it.

If I'm staring at an onrushing deadline, give me Seymour Rubinstein's muscular word processor and a memory-heavy PC every time. Everything else just doesn't cut the mustard. And version 4.0 of *WordStar* has us dizzy with anticipation. Wonder what they're cooking up for version 5.0? */PC*

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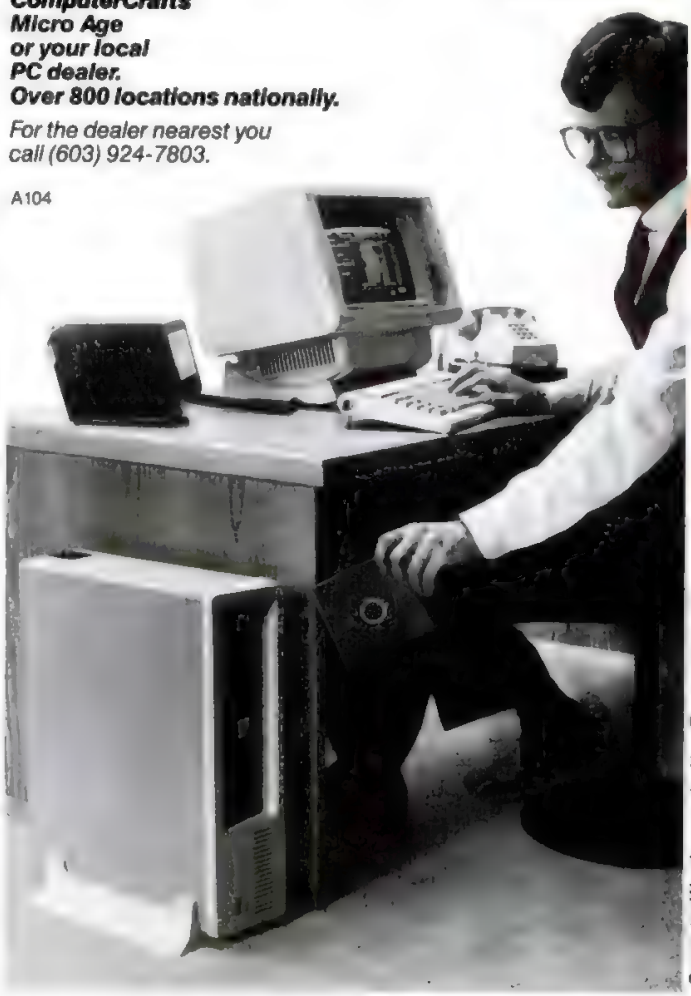
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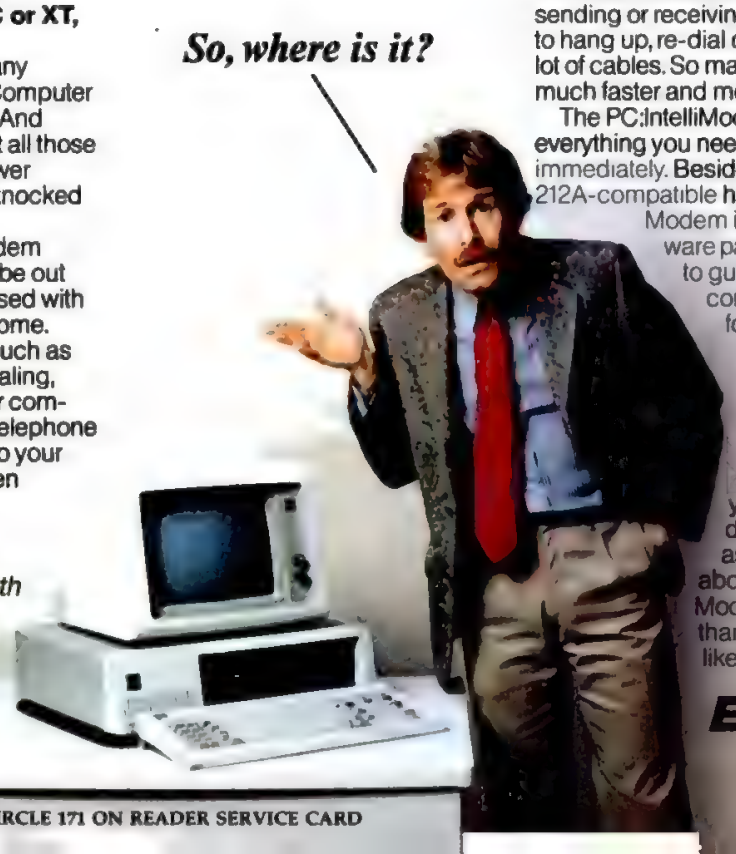
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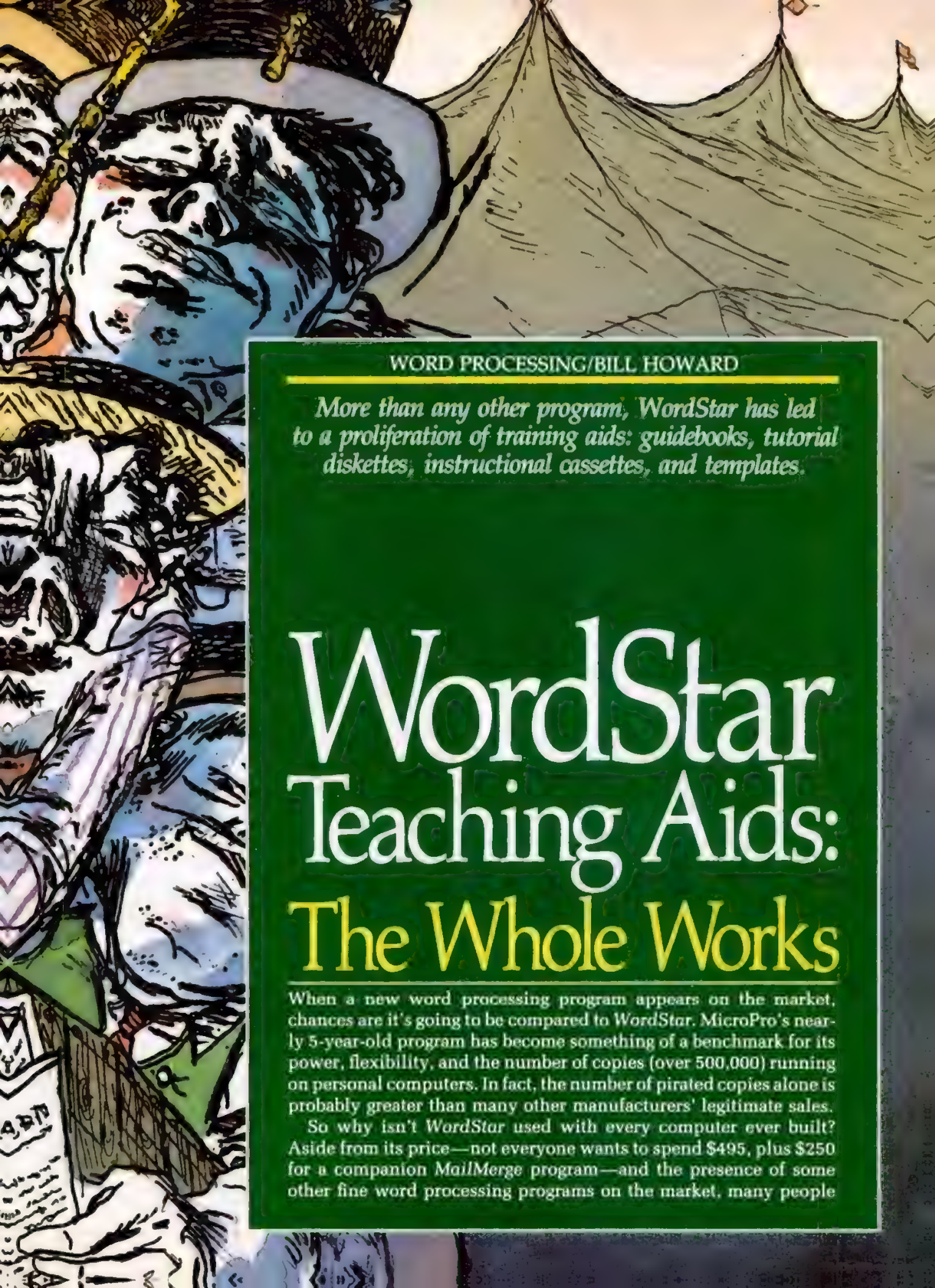
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WORD PROCESSING/BILL HOWARD

More than any other program, WordStar has led to a proliferation of training aids: guidebooks, tutorial diskettes, instructional cassettes, and templates.

WordStar Teaching Aids: The Whole Works

When a new word processing program appears on the market, chances are it's going to be compared to *WordStar*. MicroPro's nearly 5-year-old program has become something of a benchmark for its power, flexibility, and the number of copies (over 500,000) running on personal computers. In fact, the number of pirated copies alone is probably greater than many other manufacturers' legitimate sales.

So why isn't *WordStar* used with every computer ever built? Aside from its price—not everyone wants to spend $495, plus $250 for a companion *MailMerge* program—and the presence of some other fine word processing programs on the market, many people

find that *WordStar* is a bear to learn. MicroPro describes its product as "user friendly" and "easily installed by computer novices." Henny Youngman should be so funny; if the truth be known, getting *WordStar* up and running, let alone actually using it, is a complex task for the novice.

ONE evening spent with any of the cassette or disk tutorials is enough to make most anyone feel comfortable with WordStar.

Between *WordStar* and *MailMerge*, there are nearly 180 commands. Hitting a key simultaneously with the Ctrl key has one function, while hitting a two-key sequence has another. This is not a program to learn by the "lessee what this key does—oops" method. And MicroPro's *WordStar* manual, until a recent revision, was little help.

Fortunately, private entrepreneurs have stepped in to give MicroPro a helping hand, and there are numerous ways to learn *WordStar*: guidebooks, instructional programs on diskette and cassette, keyboard templates, videocassettes, and even an improved manual from MicroPro. Currently, they range in price from 50 cents to $75, but the figure will reach $200 once *WordStar* videocassette tutorials become available later this year. All of these instructional aids are helpful, some more so than others.

If you bought *WordStar* and are having trouble getting the hang of it, this article will direct you toward a number of helpful sources. Of course, "helpful" is a subjective term; each user has different needs, and each *WordStar* aid has a different way of approaching those needs. We'll examine and rate each of the training guides. If you haven't bought a word processing program yet and are considering *WordStar*, a book is probably the cheapest way to find out if *WordStar* is for you.

A word of encouragement: One evening spent with any of the cassette or disk tutorials is enough to make most anyone feel comfortable with *WordStar*. You need only to learn approximately 20 commands to edit and print most documents. Once learned, *WordStar* is easy to use, more so than such easy-to-learn programs as *Select*.

Every training aid begins by explaining how to get *WordStar* into the computer, and goes on to explain such things as understanding the menus, opening a file, entering text, moving the cursor, correcting those inevitable mistakes, saving text, printing, and the more complex commands. Except for the disk tutorials, all the aids explain *MailMerge*. Some include information on operating systems (though not necessarily IBM's) and care and feeding of computers.

The Guidebooks

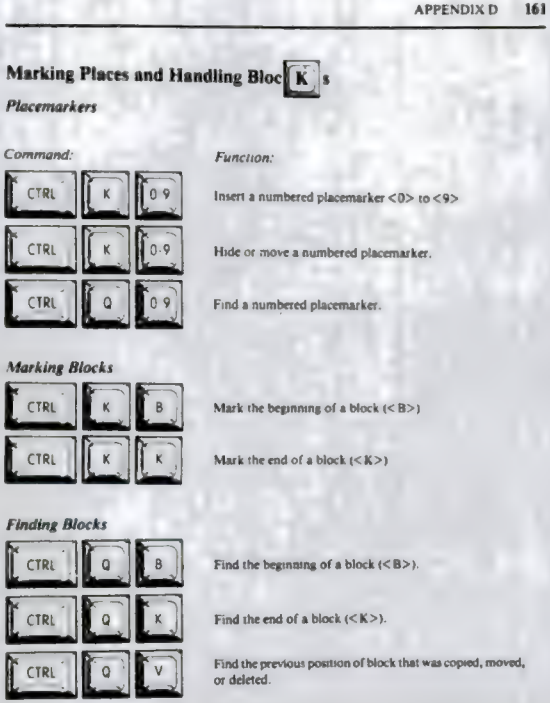
The guidebook approach to *WordStar* is not as painless a learning approach as the cassettes or disk tutorials, but, when it's time to double-check a concept, especially in the middle of a *WordStar* file, you'll need to reach for a book.

Introduction to WordStar by Arthur Naiman is at the head of the class. This book is a gentle teacher, mildly humorous, never condescending. (Make sure you get the second edition, which includes an eight-page appendix listing *WordStar* function keys on the PC.)

Naiman does a good job of explaining what happens if you do something you're not supposed to. The few examples to type in are given within the text, rather than as separate exercises at the end of the chapters. He suggests correcting mistakes as you go along, which is a more natural process than entering material, typos and all, and then going back as some other guides advise.

Several excellent appendixes at the

Figure 1: A quick reference appendix of Naiman's Introduction to WordStar *gives a summary of the block commands. This is the book's most outstanding feature.*



APPENDIX D 161

Marking Places and Handling Blocks

Placemarkers

Command:	*Function:*
CTRL K 0-9	Insert a numbered placemarker <0> to <9>
CTRL K 0-9	Hide or move a numbered placemarker.
CTRL Q 0-9	Find a numbered placemarker.

Marking Blocks

CTRL K B	Mark the beginning of a block (<B>)
CTRL K K	Mark the end of a block (<K>)

Finding Blocks

CTRL Q B	Find the beginning of a block (<B>).
CTRL Q K	Find the end of a block (<K>).
CTRL Q V	Find the previous position of block that was copied, moved, or deleted.

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WordStar: One Thing the Manuals Left Out

What are those mysterious periods and colons doing at the bottom and top of your file?

"What are all those colons and periods doing at the very top and bottom of my file? Am I inserting blank lines by mistake? Will they print out? Did I foul up the program?"

Although the concern over colons and periods is a common one, and the answer is simple, most of the *WordStar* guides ignore or gloss over the question.

The answer: If you try to scroll beyond the ends of a file, *WordStar* (instead of refusing to scroll any farther) keeps on going and inserts a line that is blank except for a colon (top of the file) or period (bottom) in the far right column of the screen. Up to 23 such lines can show up before *WordStar* quits fooling around. The lines and colons/periods are harmless; they won't print, but you can't move your cursor into the offending areas to delete them. However, you can scroll in the opposite direction to make them go away.

The colons also show up in three other situations, all when you're at or near the top of the file. Again, they cause no harm, just confusion. If the main editing menu is on, and you turn it off, the colons appear. If the main menu is already off and an auxiliary menu (print, block, etc.) comes on, the colons pop up as soon as the menu goes away. Finally, they show up when you interrupt a function and have to get out using the escape key. A printout showing the mysteriously appearing colons and dots follows. —*B.H.*

```
        B:TEST   PAGE 1 LINE 1 COL 01                    INSERT ON
                          < < <      M A I N     M E N U      > > >
    --Cursor Movement--       | -Delete-  |   -Miscellaneous-   |  -Other  Menus-
  ^S char left ^D char right  |^G  char   | ^I Tab    ^B Reform | (from Main only)
  ^A word left ^D word right  |DEL chr lf| ^V INSERT ON/OFF     |^J Help  ^K Block
  ^E line  up  ^X line down   |^T word rt|^L Find/Replce again|^Q Quick ^P Print
       --Scrolling--          |^Y  line   |RETURN End paragraph|^O Onscreen
  ^Z line up    ^R line down  |           | ^N Insert a RETURN |
  ^C screen up ^R screen down |           | ^U Stop a command  |
 L----!----!----!- --!----!----!----!----!----!----!----!--------R
```

back of the 202-page book summarize keyboard commands with sketches of the keys (see Figure 1), page formatting dot commands, and *MailMerge* commands. You'll find yourself referring to these frequently as they have a bit more substance than a simple commands chart. *MailMerge* and *SpellStar* are covered.

The cover trumpets the words *revised second edition*, but the only change is the addition of an 8-page IBM PC appendix. An error from the first edition carries over; it's still on page 174, and states that, in *MailMerge*, typing in &Name&/O omits a line if there's no data for a person's name, when in fact the correct sequence is &Name/O&.

A half dozen changes would make *Introduction to WordStar* superb. They should include integration of IBM specifics throughout the main text, updates to reflect *WordStar* 3.24 and 3.30 (it's written for 3.0), a bit more on *MailMerge* (printtime line forming commands are omitted), cross-references to the MicroPro manual, stick-out index tabs for rapid reference, and a pullout card listing commands.

If you have only ten bucks to spend learning *WordStar*, spend it on *Introduction to WordStar*.

WordStar Made Easy is the original nonMicroPro *WordStar* guide. There are exercises at the end of each chapter, which may remind the user of grade school. (Fortunately, there is no dress code and no morning pledge of allegiance to the flag.) The writing, however, could be more lucid.

Since no made-EZ manual is going to have the depth of the manufacturer's documentation, author Walter A. Ettlin wisely cross-references each paragraph or concept to the correlating one in the *WordStar* manuals, but, unfortunately, he gets only as far as version 3.0. Also, no mention is made at all of the IBM PC and its special keys.

Ettlin covers *MailMerge* (in more detail than *Introduction to WordStar*), *SpellStar*, and CP/M, but not IBM's CP/M-86. A handy cardboard chart of *WordStar* commands detaches from the back of *WordStar Made Easy*.

Sybex, which publishes *Introduction to WordStar*, has a new book out, *Practical WordStar Uses*, by Julie Anne Arca, which provides some specific examples of how *WordStar* can be used and takes the user step-by-step through them. The book includes a *WordStar* commands poster, which is particularly useful to those already somewhat familiar with *WordStar*.

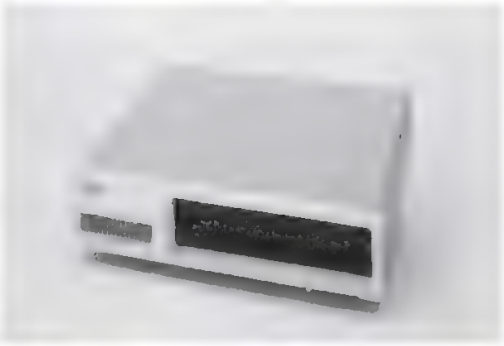
Using the IBM Personal Computer: WordStar, by C.J. Puotinen, comes with a diskette of text examples for editing practice, sparing PC users who already know how to type the agony of typing practice. So far, it's the only book that integrates discussion of IBM PC keys into the main text. And what a text it is: 357 pages, without a single illustration. Not until page 81 do you learn how to delete a character. PC-DOS is covered, but there isn't enough room to squeeze in *MailMerge* or *SpellStar*.

The back cover, usually reserved for kudos from reviewers, is given over to what appears to be an innovative index; match a black bar for the topic you want with a corresponding black bar inside the book, and you're there. Neat idea, except the bars don't line up with the topics. Also, instead of CR or Return to indicate a carriage return, the book uses the at (@) symbol. (At least this book uses carat symbol (^), for control, while others use the up arrow (↑), which is easily confused with the IBM PC's up-arrow shift key.)

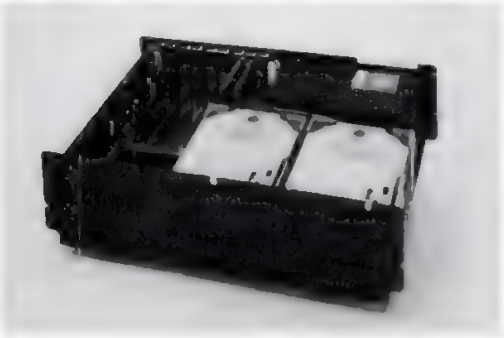
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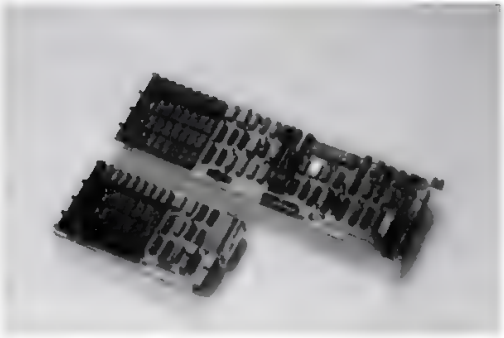
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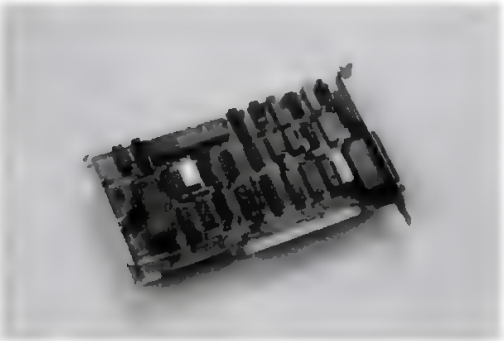
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Using the IBM Personal Computer: WordStar begs the question: Is the world ready for a $40 book that's 103 pages longer than *WordStar*'s own manual? Puotinen also wrote *The Last Word on WordStar*, essentially the same book but for CP/M machines and without the text diskette. It's a mere 317 pages.

Pocket Guide to WordStar is a cross between a book and a reference guide. Visually, it looks like 96 postcard-size, postcard-stiff pages bound together into a vertical spiral notebook. The cover is an unforgettable checkerboard of colors, heavy on the oranges. Inside, there are brief descriptions of *WordStar*'s features and functions, plus explanations of CP/M-80 and CP/M-86. Some of the practical tips are handy, such as the discussion of making *WordStar* files compatible with other word processing systems. The *Pocket Guide* is probably best for the PC user running *WordStar* under CP/M-86 but not under PC-DOS.

The Illustrated CP/M-Wordstar Dictionary would appeal most to an IBM PC user running *WordStar* through an 8-bit Z80 adapter card such as the one manufactured by Baby Blue. Rather than chapters, the book is divided into 75 modules; each is two or three pages long and covers a specific topic. *MailMerge* and *SpellStar* are covered, as is CP/M-80. Illustrations abound—many of them look like diagrams of football plays, with arrows indicating the cursor's movement. Not bad, once you get used to them.

THE inside cover of the WordStar 3.3 Manual warns, in six languages, that you're in a heap of trouble if you're caught duplicating a MicroPro product.

BE careful not to inadvertently hit the Esc key; if you do you will be unceremoniously exited from the program.

MicroPro's Documentation

The proliferation of *WordStar* learning aids is due in no small part to the old, notoriously inadequate (version 3.24 and earlier) *WordStar* manuals. The original was comprised of a loose-leaf notebook with a brief general overview of *WordStar*, an installation section that might as well have been in a foreign language—followed by a reference section expanding on the overview. One never was sure whether to look up a topic in the overview or reference section. The original manual had only a handful of illustrations, no index for the overview or reference sections, and the writing was almost incomprehensible. The manual was prepared using *WordStar*, printed on a Super Courier daisy/thimble printer, and dutifully photocopied half a million times for half a million customers.

In mid-1981, *WordStar* introduced *The MicroPro Training Guide* in the form of a giant steno-pad book. It covers *WordStar*, *MailMerge*, *SpellStar*, but not *StarIndex*, MicroPro's intriguing new table of contents/indexing program. It was better than nothing, but no match for the subsequent stream of *WordStar* books from other manufacturers.

The big change in documentation came with *WordStar 3.3*, released in July 1983. It moves MicroPro's documentation rating from near bottom to the upper crust. The old general overview and reference sections are combined into one, resulting in an easier-to-read *Reference Manual*, with graphics and cartoons, followed by the *Training Guide*, which is only modestly revised, and a greatly simplified *Installa-*

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tion Manual. It's now typeset and printed on 6-by-9 paper. Its unusual size makes the photocopied, pirated copies easy to spot. Its IBM-reference-sized, black D-ring binders "make an impressive appearance on retail shelves," in MicroPro's words. The inside cover of the *WordStar 3.3* manual warns, in six languages, that you're in a heap of trouble if you're caught duplicating a MicroPro product. There's also a cardboard command chart.

The new manual is vastly improved, but you'll probably still want a second viewpoint on learning *WordStar*. A few of the concepts still are not explained clearly enough, and some key points are confusing, not covered, or mentioned only casually. For instance, no explicit information is given on the line-height command needed to specify double-spacing. It assumes you intuitively know that .LH 16 is *WordStar* talk for double spacing. The section on soft hyphens (hyphens that print only at the ends of lines) uses French in words in the examples, which makes it appear that soft hyphens are used only in that language.

The *Reference Manual* (the section of the documentation that explains how to use *WordStar*) has ten chapters. Each chapter is marked with a blackened block with the name of the section given in reverse type at the page edges for relatively easy location. To make the manual easier to use, I suggest inserting ten plastic or cardboard subject dividers, and either moving the command summaries from the end of the chapters to the beginning, or moving them all to the front of the book. Also, remove the first four title sheets so the first page you come to when opening the book is the contents page.

Disk-Based Tutorials

The makers of diskette-based instructional programs use the computer-as-instructor approach and would argue that it is the only sensible one. You can operate the tutorial at your own pace, and it tells you whether you hit the right keys. The makers of cassette-based instructional programs, however, point out that the disk tutorials merely simulate *WordStar*.

To log onto the two-disk second course, Command Power, requires DOS in drive A.

Both the diskettes and cassettes have their merits. Disk tutorials certainly are handier for reviewing specific lessons. Cassettes, however, make use of an additional sense—hearing.

Disk tutorials require letter-perfect input. For instance, none of them budges unless you type two spaces, not one, between sentences. And be careful not to inadvertantly hit the esc or E keys; if you do you will be unceremoniously exited from the program without so much as an "Are you sure?" prompt.

The three-disk American Training Institute (ATI) Training Power tutorial course comes in two volumes: *ATI WordStar Menu Power Vol. I* (1 disk) and *ATI WordStar Command Power* Vol. II (2 disks). The program is generic; it doesn't cover special IBM PC functions on disk or in the two cardboard-jacketed reference books, which cover menus, basic cursor movement, text entry (Menu Power) and more complex commands (Command Power).

The ATI tutorial is somewhat stodgy. It works, but you have to work at it and do things its way. To some, the comparatively rigid structure of the course may be an advantage; to others, it is a drawback. For instance, to move to the left side of one practice line, you must move the cursor left by pressing Ctrl-S 15 times, rather than by typing *WordStar*'s handier Ctrl-A (for word-left) or Ctrl-QS (left-side-of-line).

To log onto the two-disk second course, Command Power, requires the user to bring up DOS in drive A, log onto drive B, then change disks and run the program CPOWER in drive A.

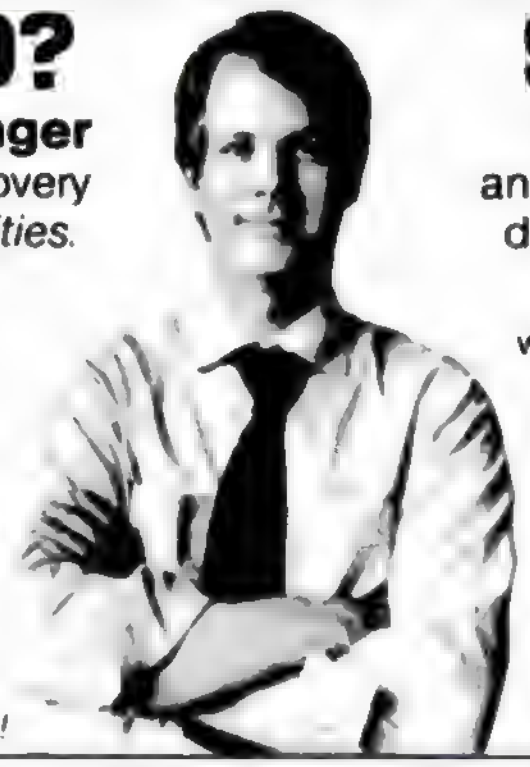
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board reference books. Compared to vinyl binders (*CDex* and *FlipTrack*, for instance), the cardboard appears shopworn. When everything is opened and spread on a desk, there's so much cardboard lying around, it looks like the remnants of a McDonald's—Did a tree die for this?—lunch.

The *CDex WordStar Training Program* is a joy to use. There are graphics of sorts (even on the PC's monochrome display) and options to simulate *WordStar 3.24/3.21* or *WordStar 3.3*. Each of the eight topics can be reviewed quickly (2 to 3 minutes) or in greater detail (10 to 15 minutes claimed).

Sprinkled through the *CDex* course are multiple-choice questions, each with the options of answering the question immediately, reviewing the material first, getting a hint before answering the question, or skipping the question and continuing. A wrong answer is followed by an explanation and a chance either to answer the question again, or to skip along.

At the end of the topic (chapter), there

How 3.3. Differs from Earlier Versions

A list of the revised WordStar commands.

If the training guide you buy doesn't cover *WordStar 3.3* or the PC's special keys, here's a list of the changes from earlier *WordStar* versions. You can use the special PC keys or the generic *WordStar* keys interchangeably.

IBM PC Key	WordStar 3.3 Command	What It Means
↑,←,→,↓	^E, ^S, ^D, ^X	Cursor movement
PgUp	^R	Scroll up 1 screen
PgDn	^C	Scroll down 1 screen
Home	^QE then ^QS	To home pos. this screen
End	^QX	Bottom of this screen
F1	^JH	Set help level
F2	^OG	Temporary indent to tab
F3	^OL ESC	Set left margin at cursor
F4	^OR ESC	Set right margin at cursor
F5	^PS	Underline
F6	^PB	Boldface
F7	^KB	Mark beginning of block
F8	^KK	Mark end of block
F9	^QR	Cursor to beginning of file
F10	^QC	Cursor to end of file

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The *WordStar* 3.3 Opening Menu used to be called the "No File Menu." It's the same menu, aside from the name change.

Pressing Ctrl-R (scroll up one screen) still does the same thing—it displays the previous screen, the one closer to the top of the document. Before version 3.3, it was described as "scroll down one screen," as if a printed roll was moved down past a tiny window so you could see what was higher up on the roll. It's equivalent to the PgUp key.

Ctrl-C—"scroll down one screen" in version 3.3—used to be called "scroll up one screen." It's equal to the PgDn key and displays the next screen, the one closer to the bottom of the file.

The effects of F9 (cursor to beginning of file) and F10 (cursor to end of file) in version 3.3, were the other way around in earlier versions.

To delete a character to the left of the cursor, use DEL if the keypad is shifted for the cursor movement keys. If the keybad is shifted to enter numbers, Ctrl-Backspace (use the backspace key above return, not the keypad's cursor-left key ←) always works. To delete the left side of the line, use Ctrl-Q Backspace. The generic Ctrl-Q Del won't work.

—*B.H.*

is an exercise listed in the accompanying 97-page guidebook. To run them, you must suspend *CDex* and run *WordStar*. (This inconvenience is not encountered with a cassette program.)

The *CDex WordStar* tutorial comes on four diskettes, but since only one drive can be used, mucho disk swapping goes on. The disks and booklet are nicely packaged in a black vinyl binder encased in shrink wrap.

Two *CDex* oddities: Instructions on how to insert the disks are given on the disks. And, *CDex* comes with the standard "if you don't like our license agreement, don't open this package" warning. Guess what you have to open to find the note?

WordTutor is a disk tutorial developed by MicroPro, possibly as a free addition to the WordStar program. (MicroPro is uncertain whether to make it a freebie or extra-cost.) Eventually, *WordTutor* will be a six-lesson tutorial, but it won't cover *MailMerge*. *PC* obtained an advance look at the first *WordTutor* lesson. While much shorter than the ATI tutorial or *CDex*, it

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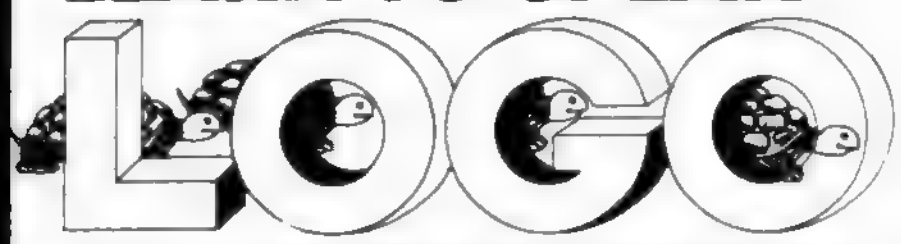
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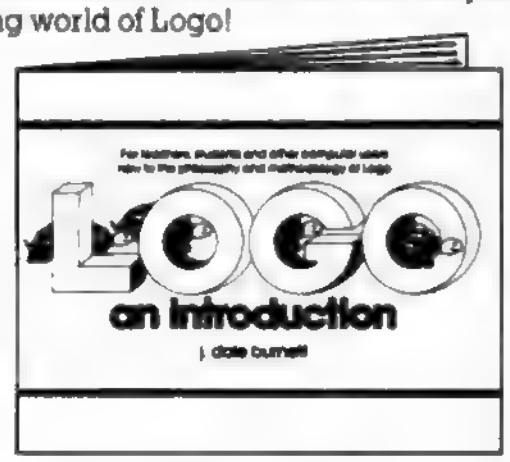
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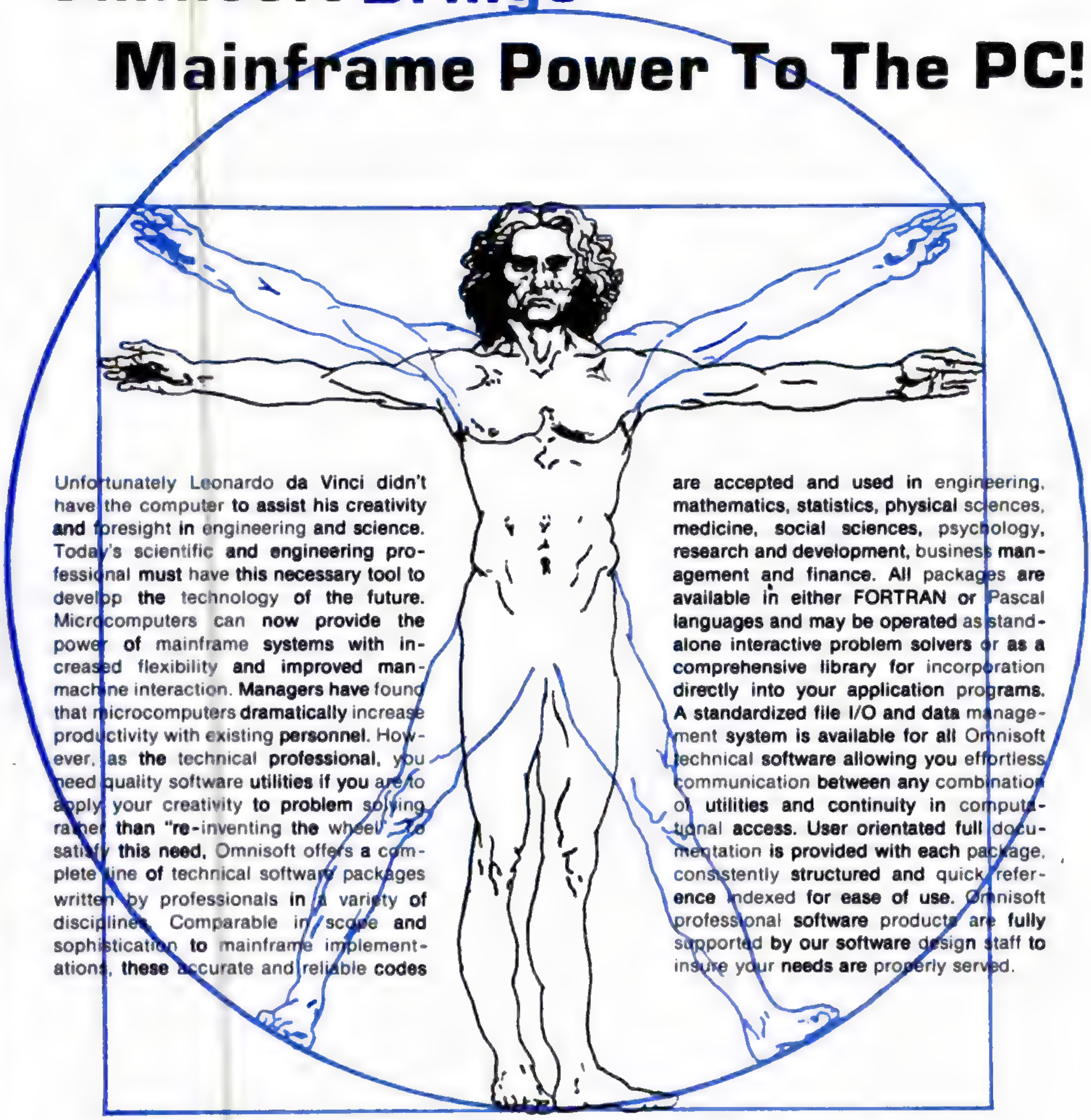
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CIRCLE 309 ON READER SERVICE CARD

nicely fulfills two MicroPro marketing concerns: covering the commands and menus needed to get a first-timer up and running, and proving WordStar won't bite. MicroPro also is bringing out *Fear-*

IF YOU have more than one type of computer, you only have to buy one WordStar cassette tutorial.

Not, a quickie, upbeat, disk-based introduction to computers for the uninitiated, and is completing a videocasette *WordStar* tutorial. Both *WordTutor*'s first lesson and *Fearnot* each take up 50K RAM.

PC tested all three tutorials on the IBM PC, the PC-XT, the PC-XT with the IBM color monitor, and the Compaq. All ran fine. *CDex* runs in color, but not on every screenful. This was done intentionally to avoid overpowering the learning concepts, a CDEX spokesman said.

Cassette Tutorials

If you have more than one type of computer, say an IBM PC and an Osborne, you only have to buy one *WordStar* cassette tutorial, since none of them are computer-specific. Some people may like the sound of a human voice guiding them through *WordStar*, though, in all cases, the voice will be male.

Of the two cassette companies, FlipTrack has only a half dozen tutorials on the market, while Micro Instructional has about 75. Here, it's a case of the better wine coming from the smaller vineyard.

FlipTrack offers a set of three tapes covering *WordStar* and a fourth on *MailMerge*. The entire package is marketed under the name *How to Use WordStar & MailMerge*. Each runs from 50 to 53 minutes on the front sides and for almost that long on the flip sides. When the going gets tough, there's further instruction on the back sides—(flip the tape over, set the counter to 0, listen to the extra material,

continued

How WordStar Works

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WordStar is a "what you see is what you get" word processor. What comes out of the printer is a replica of what's on the screen. You can see all but three or four lines of a page of double-spaced work on your screen.

Every alphabet key does double duty. Striking the Ctrl key and another key simultaneously moves the cursor around, calls up helpful screens of information, reformats the screen display, moves type, and tells the printer what to do.

A diamond pattern of keys on the left side (copied by many other programs) moves the cursor around the screen:

```
    W     E     R
  A   S       D   F
    Z     X     C
```

To go up, press Ctrl-E. To go left, press Ctrl-S, etc. The other keys on the left side move words, lines, or entire screens left-right or up-down. They're geographically assigned: on the top row, W, E, and R, when pressed simultaneously with the Ctrl key, all move you higher up in the document.

continued

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rewind the tape to 0 so you're back where you left off, flip the tape to the front side)—hence the name FlipTrack. Nothing on the back is absolutely essential to using *WordStar*, but it's either extra for experts or help for the confused. For instance, it offers a debugging session for the first time a document is printed out, and it gives you its thoughts on what might have happened if the printer didn't put out what the screen showed. FlipTrack says it has a patent on the concept.

FlipTrack's tapes are especially good for the computer novice, who may be coming over from an old typewriter. It reminds you to touch the keys lightly so as not to trigger auto-repeat, not to confuse the lowercase letter *l* with the number one, and how to shut the computer down (pull the diskettes before the plug) if you want to

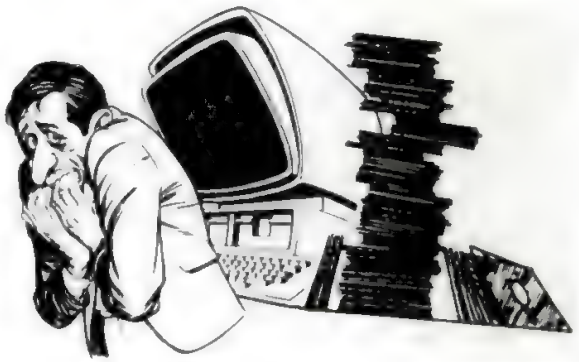
The rest of the Ctrl key functions are, for the most part, assigned randomly. Don't look for a logical pattern of placement.

Because there are some 165 *WordStar* commands (about 20 are necessary to get started with *WordStar*—the rest are used for default settings) and just 26 alphabet keys, most commands are two characters. For instance, to get *WordStar* to print in boldface type, press Ctrl-PB (one case where *WordStar* and you would actually think of the same letters: Print Bold). If you know the first part of the sequence (Ctrl-P), but forget the second, type in Ctrl-P and *WordStar* will replace the main editing menu with a print commands menu. Find the letter you want, strike a key, and the menu disappears until needed again.

The commands are divided between the main menu (normally on), and menus for printer enhancements (Ctrl-P), on-screen formatting (Ctrl-O), moving/adjusting blocks of type (Ctrl-K), help (Ctr-]), and quick-movement (Ctrl-Q) commands. The divisions aren't entirely obvious. For instance, is right justification an on-screen command because type shows up justified on the monitor, or is it a print command because you want to print out justified type? (Answer: it's an on-screen command.) There also are dot commands that are typed at the beginning of the document and determine the format of the printout. (Unlike the other commands, the dot command menus do not come up when you strike a Ctrl-period and forget the rest.) Dot commands are thorough. Some word processors don't even include superscripts, while a *WordStar* dot command lets the user increment the height of the superscript in 1/48ths of an inch.

The IBM PC version of *WordStar* has ten function keys, which supplement some of the most commonly used commands (or at least what MicroPro thinks are the ten most common), and cursor con-

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CIRCLE 417 ON READER SERVICE CARD

take a break from the instruction. The sound quality is good, words are clearly enunciated, the speaker recaps each segment, and there are short beeps and musical jingles separating topics. A 71-page reference manual corresponds to the tape

continued

trol keys (the numeric keypad), which duplicate the ESDX cursor control diamond. The newest *WordStar 3.3* allows reprogramming and function keys, as well as resetting the defaults if the user doesn't like the factory settings.

WordStar allows printing and writing at the same time. Document length is limited only by disk storage. There's a nondocument mode to write programs. Many nonMicroPro products work with *WordStar*, such as *dBase II*.

Because *WordStar* is so powerful, it's easier to describe what it can't do. Boldfaced, underlined, and super/subscripted words don't show up that way on-screen, an exception to the "get-what-you-see" rule; the method of turning them on and off guarantees you'll occasionally underline every part of the document except the part you want. There's no split screen to compare two documents. You can't jump directly to a specific page, paragraph, or sentence. It won't add up columns of numbers or automatically place footnotes, although there are nonMicroPro programs that you can bolt to *WordStar* to do these tasks.

WordStar can't quickly dump a short memo to the printer without a save and print sequence—the PC's Shift-PrtSc command prints the *WordStar* status line and editing menu as well as the memo. It can't run some budget printers, nor can one *WordStar* program run two printers. It can microjustify by inserting slivers of space between letters, not just words, to give a fair approximation of justified typeset material). Though *WordStar* can print multiple columns, useful for a newsletter, it can't microjustify multiple columns.

Still, no word processing program is perfect. To many serious users, *WordStar* is the least imperfect, and, at the advanced age of 4-½ years, still king of the heavyweights. —*B.H.*

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and can be used on its own, too.

The FlipTrack tapes are generic, with no specific mention of the IBM PC or its function keys, but there are points where you are encouraged to experiment with your keyboard. For instance, you are asked to see if your keyboard has an insert key, which could be used instead of *WordStar*'s Ctrl-V insert function. ("That's 'V' as in 'Victor,' " the announcer says, "and don't try to look for any [mnemonic] meaning in that.")

The Micro Instructional tapes, *WordStar General* (introductory), *WordStar-IBM PC*, and *Advanced WordStar*, can be bought separately. They run 72, 73, and 68 minutes, respectively. The PC tape is the general tape with a 50-second tour of the PC's function keys inserted. (*Advanced WordStar* is about *MailMerge*.)

Overall, the Micro Instructional tapes aren't in the same league with FlipTrack. There's a bad recording that occurs early in the general tape, the sound quality is mediocre (Ctrl-B, -D, -V, -P and -T are difficult to distinguish), topics aren't separated by silence or music, and MI teaches some strange *WordStar* concepts.

For instance, MI says dot commands (printer format commands that start with a period) should be typed with capital letters and a space before the number. In fact, *WordStar* is happy with upper or lowercase, space or no space. The user is instructed to format a letter with the page-length command .PL 66 (66 one-sixth-inch lines, or 11 inches), with no mention that .PL 66 is an automatic default of



WordStar has given rise to a myriad of training aids to help you teach yourself.

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WordStar. One form letter that supposedly will be used to teach *MailMerge* is created using *WordStar*'s nondocument mode even though it's a document—and a few minutes later, it's abruptly abandoned.

MI was founded by an exterminator; it's ironic the *WordStar* tapes should have so many bugs. Micro Instructional must be doing something right, though, since it's sold thousands of tapes to Xerox and Kay-Pro to give to their customers. Perhaps the *WordStar* tapes don't represent MI's best effort.

The company is preparing a new tape integrating the PC functions thoughout the tape. A prereleased copy of the revised tape had better sound quality, better divisions between topics than other Micro Instructional *WordStar* tapes, and adequate mention of the special IBM PC keys.

Templates

Templates can be handy memory-jog-

continued

Product Information

Production information for the WordStar training guides mentioned in the article and for those soon to be released.

Books

WordStar Made Easy, second edition
Walter A. Ettlin
(Osborne/McGraw Hill, Berkeley, CA, 1982)
164 pages; $11.95

CIRCLE 575 ON READER SERVICE CARD

Introduction to WordStar, second revised edition
Arthur Naiman
(Sybex, Berkeley, CA, 1983)
202 pages; $8.95

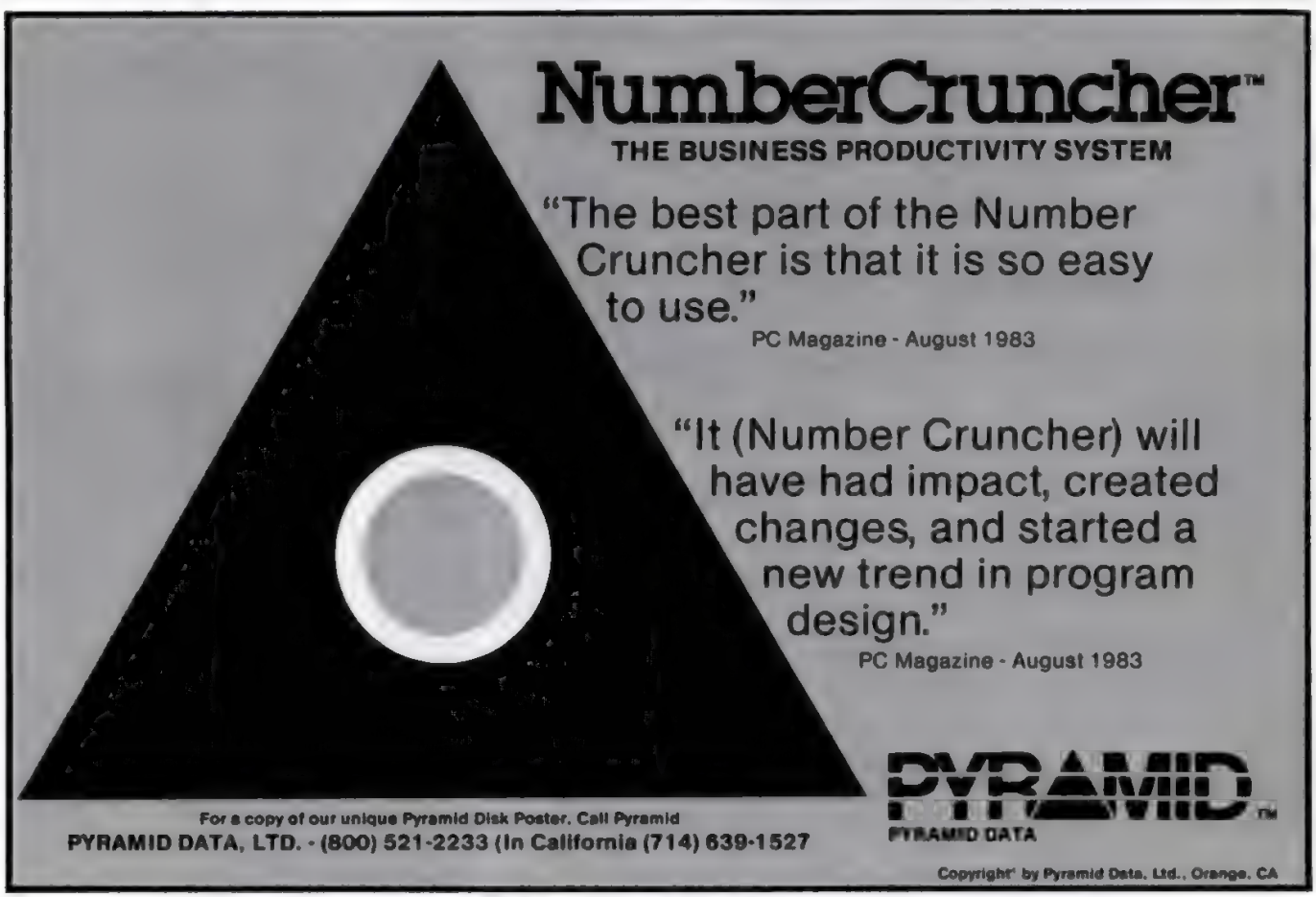
Practical WordStar Uses,
Julie Anne Arca
(Sybex, Berkeley, CA, 1983)
200 pages; $13.95

CIRCLE 574 ON READER SERVICE CARD

The Illustrated CP/M WordStar Dictionary
Russel A. Stultz
(Prentice-Hall, Englewood Cliffs, NJ, 1983)
258 pages; $14.95

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CIRCLE 605 ON READER SERVICE CARD

gers but, alone, are not enough to teach *WordStar*. Three templates fit around the PC keyboard and provide ready reference to *WordStar* and *MailMerge* commands.

The $20 Kleertex template puts all the commands on one side. The back side has *VisiCalc* or *SuperCalc* templates ($13 extra) or is ruled for the do-it-yourselfer. The $15 PC-DocuMate splits *WordStar* commands over two sides.

Choosing between the two is tough. Having the commands on one side is easier for the user (advantage Kleertex), while two sides allows for larger type, slightly longer explanations of the dot commands and their default values, and a few extra commands, such as search and replace options (advantage PC-DocuMate). The Kleertex seems slightly better organized while the PC-DocuMate's reverse-type subject headings (black on white) are easier to locate. The Kleertex comes in a cardboard carton; the PC-DocuMate in a foam-board-stiffened envelope that is somewhat resistant to bending by Postal Service

continued

Pocket Guide to WordStar
Anthony Bove and Cheryl Rhodes
(Addison-Wesley, Reading, MA, 1983)
96 pages; $7.25

CIRCLE 572 ON READER SERVICE CARD

Using the IBM Personal Computer: WordStar
C.J. Puotinen
(CBS Educational & Professional Publishing, New York, 1983)
357 pages; $16.95, $39.95 with diskette

The Last Word on WordStar
C.J. Puotinen
(CBS Educational & Professional Publishing, New, York, 1983)
317 pages; $16.95, $39.95 with diskette

CIRCLE 571 ON READER SERVICE CARD

WordStar 3.3 Reference Manual, WordStar 3.3 Training Guide, WordStar 3.3 Installation Manual
StarIndex 1.0 Reference Manual, MailMerge 3.3 Reference Manual, SpellStar 3.3 Reference Manual
(MicroPro International Corp., San Rafael, CA, 1983)
Manuals supplied with programs. *WordStar* ($495), *MailMerge* ($250), *SpellStar* ($250), or with updates ($85, $25, $25, respectively, or free if previous version bought after April 1, 1983)

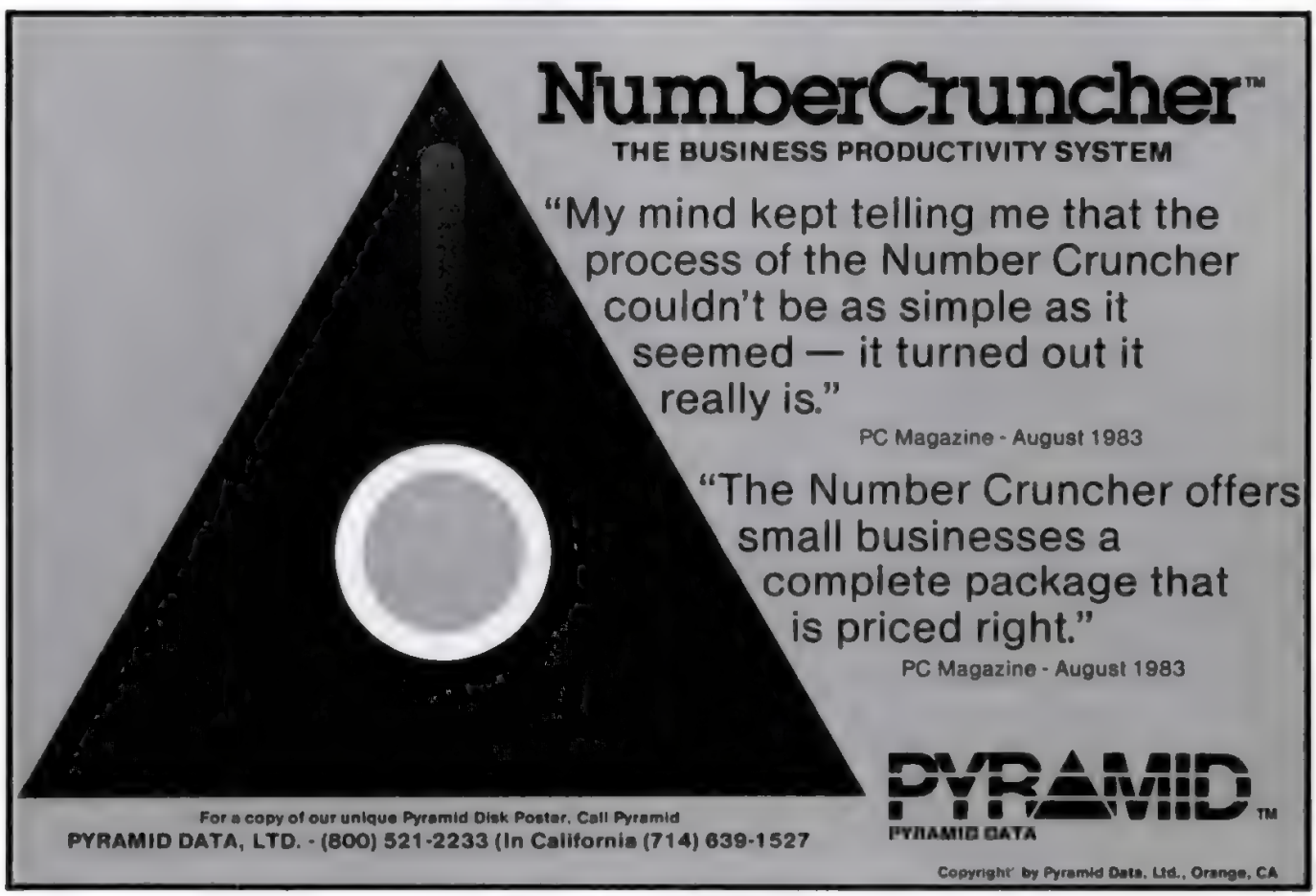
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ATI WordStar Command Power Vol. II
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Requires: two disk drives, 64K RAM, PC-DOS

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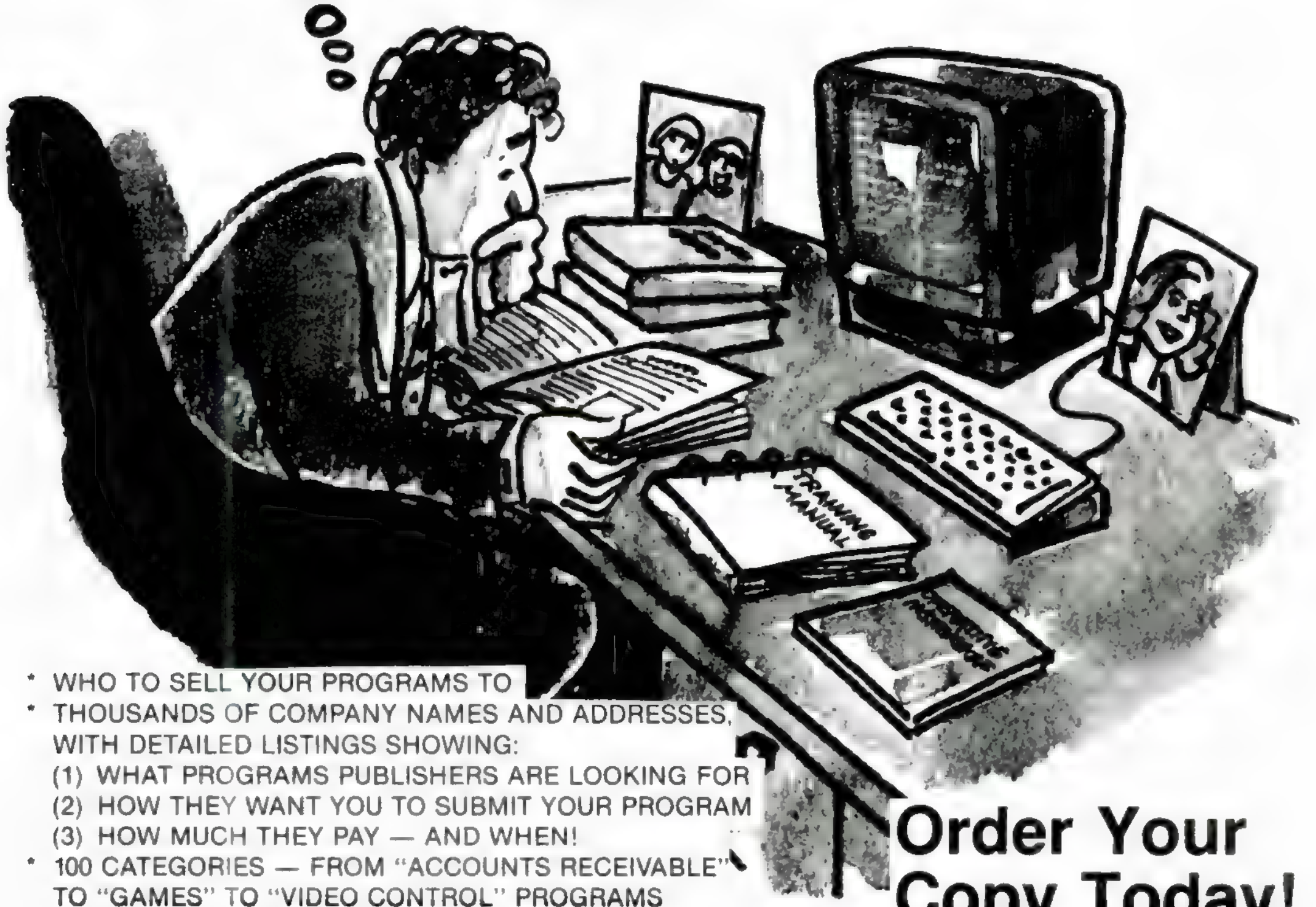
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gorilla types but not always resistant enough.

Both templates group commands differently from the other and from the way *WordStar* does. Though there may be educationally sound reasons for the difference in groupings, the variation may confuse novices.

For the PC user on a budget, check out

continued

CDex WordStar Training Program
Cdex Corporation
5050 El Camino Real
Los Altos, CA 94022
(415) 964-7600
List Price: $69.95
Requires: one disk drive, 64K RAM

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WordTutor
MicroPro International Corporation
33 San Pablo Ave.
San Rafael, CA 94903
(415) 499-1200
List Price: TBA, or supplied with *WordStar 3.3*
Requires: 64K RAM, one disk drive, PC-DOS

CIRCLE 567 ON READER SERVICE CARD

Cassette Tape Tutorials

How to Use WordStar
How to Use WordStar & MailMerge
FlipTrack Learning Systems
526 North Main St.
Box 711
Glen Ellyn, Il 60137
(312) 790-1117
List Price: $49.95 for three *WordStar* tapes, $65 for *MailMerge* tape and same three *WordStar* tapes.
Requires: Cassette recorder, preferably with counter

CIRCLE 566 ON READER SERVICE CARD

WordStar General instructional tape
WordStar-IBM PC instructional tape
Advanced WordStar instructional tape
Micro Instructional Inc.
6299 W. Sunrise
Fort Lauderdale, FL 33313
(305) 584-3133
List Price: $29.95 each
Requires: Cassette recorder

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WGM

the *WordStar* Keyboard Primer, which costs 75 cents. (When was the last time a computer accessory set you back 75 cents?) Also look into the companion Function Key Template by V&P Business Systems, a Boston-area word processing company that sells these as a sideline. The Primer is a 2-by-15 inch strip of bristol, which can be taped to the keyboard, monitor, or wherever you want it, and which covers all *WordStar* and *MailMerge* commands. The template lists the *WordStar* function keys. It's also available blank—just the thing, now that function keys are readily redefined. The only drawback to the V&P Primer is the small type size—it's a bit hard on the eyes.

All three templates are for *WordStar* 3.24; versions for 3.3 should be on line by

continued

Keyboard Templates

PC-DocuMate WS-100 keyboard template for WordStar 3.24.
Systems Management Associates
Box 20025
3700 Computer Dr.
Raleigh, NC 27619
(919) 787-7703
List Price: $14.95
Requires: IBM PC keyboard or Keytronics/IBM PC-type keyboard (15-⅞ × 4-¼)

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Kleertex WordStar Keyboard Template
Creative Computer Products
Box 85152, MB134
San Diego, CA 92138
(619) 268-0793
List Price: $19.95 *WordStar* (blank, ruled back side), $32.95 *WordStar* backed by *SuperCalc* or *VisiCalc* ($1.95 shipping)
Requires: IBM PC or Keytronics/IBM PC-type keyboard

CIRCLE 563 ON READER SERVICE CARD

WordStar Keyboard Primer
WordStar Function Key Template
Blank Function Key Template
V&P Business Systems Services
Box 1332
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the time you read this.

If *WordStar* isn't your program, every one of the companies offers training guides. Most commonly available are those for *EasyWriter* II, *VisiCalc*, *SuperCalc*, and *MultiPlan*. And some training programs are in the works for Lotus *1-2-3* and the powerful program *dBase* II.

It's also possible to arrange classes through a computer dealer or an outside company, especially if you're in a big city. (See "In Search Of Computer Training," *PC*, Volume 2 Number 3) for a comprehensive list of classroom training and do-it-yourself tutorials on disk and cassette.)

By the end of the year, look for several more *WordStar* training programs, including videodisks and videocassettes (make sure the manufacturers have figured out a

Upcoming WordStar Guides

WordStar Training Videocassette
Computer Labs of America
9340A Clairmont
Mesa Blvd.
San Diego, CA 92123
(619) 576-1133
List Price: $199, or leased to training programs
Requires: Videocassette recorder

CIRCLE 561 ON READER SERVICE CARD

WordStar Training Videocassette
Micro Learning Concepts Inc.
380 Lexington Ave., Suite 1208
New York, NY 10017
(212) 687-0066
List Price: TBA
Requires: videocassette recorder

CIRCLE 560 ON READER SERVICE CARD

WordStar Training Videocassette
Bay State Productions
35 Springfield St.
Agawam, MA 01001
(413) 786-4454
List Price: TBA
Requires: Videocassette recorder

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WordStar Training Videocassette
MicroPro International Corp.
33 San Pablo Ave.
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List Price: TBA
Requires: Videocassette recorder

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way to make 80 columns of information legible on TV sets), and updates the existing materials that reflect *WordStar 3.3* and the specifics of the IBM PC keyboard.

Cdex is by far the best disk tutorial, FlipTrack's *How to Use WordStar*, the best cassette, and Naiman's, *How to Use WordStar*, the best book; but sometimes the best teacher is a personal *WordStar* whiz, standing over your shoulder. Whatever your choice, we hope you get the word.

/PC

Criterion Personal Learningware for WordStar (two one-hour cassette tapes, keyboard template)
TechniLogic
2634 Chapel Blvd.
Durham, NC 27707
(919) 493-4560
List Price: $29.95 ($1.50 shipping)

CIRCLE 557 ON READER SERVICE CARD

WordStar Tutorial Program (disk, two cassette tapes, reference cards)
InfoSound
1160 Eisenhower Place
Ann Arbor, MI 48104
List Price: TBA
Requires: cassette recorder

WordStar Training Cassette Tape
Personal Tutor Associates
ExecSystems Corp.
Box 246
Clinton, MD 20735
(301) 856-2280
List Price: $49.95
Requires: cassette recorder

CIRCLE 556 ON READER SERVICE CARD

WordStar Disk Tutorial
Data Processing Education Corp.
5701 North High Street Suite 108
Columbus, OH 43085
(614) 888-7333
List Price: TBA

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Teach Yourself WordStar on the IBM PC
DELTAK Microsystems Inc.
East/West Technological Center
1751 West Diehl Rd.
Naperville, Il 60566
(800) 282-5586, (312) 369-3000
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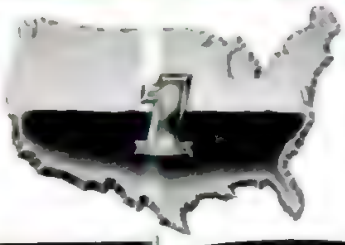
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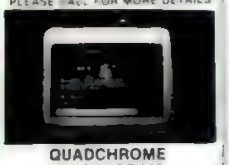
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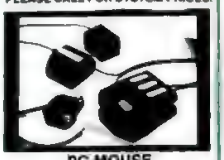
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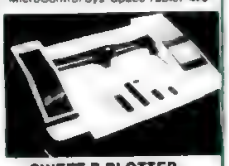
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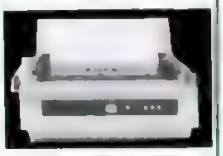
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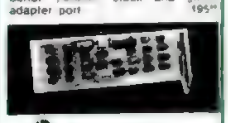
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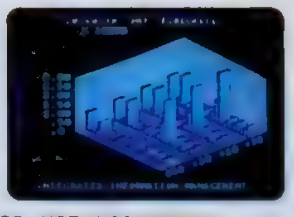
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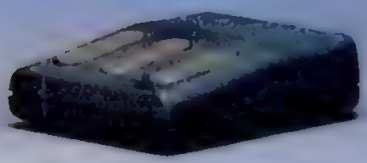
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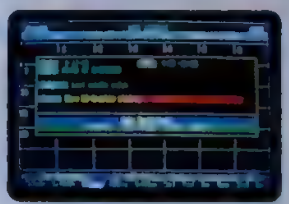
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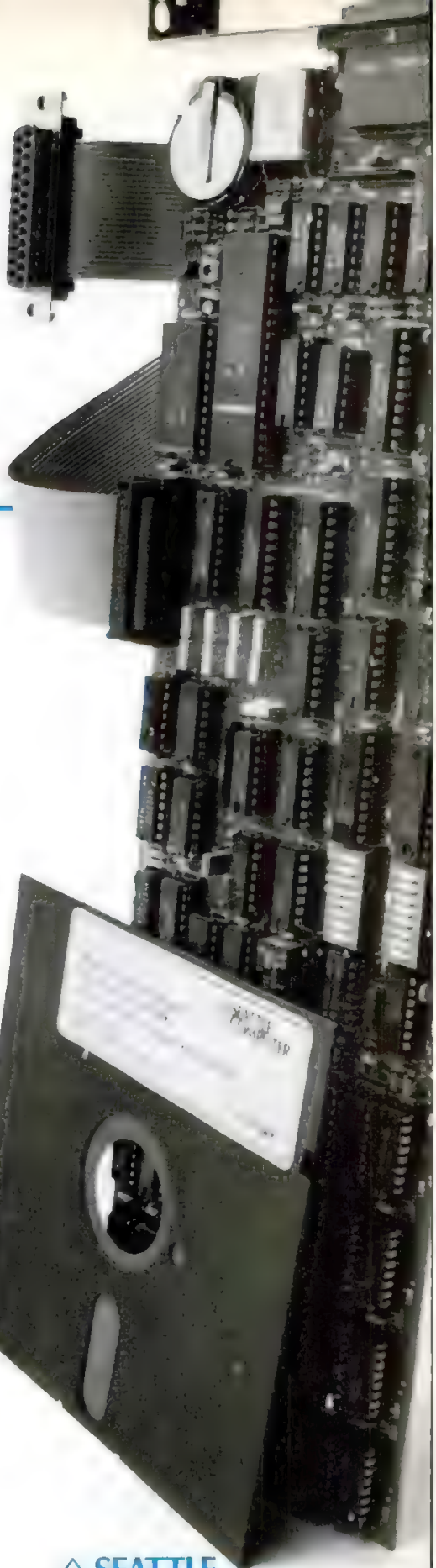
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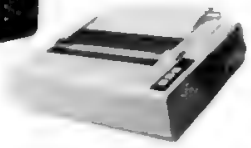
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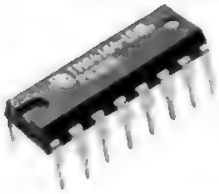


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Competitors abound in the personal computer marketplace. Though Apple leads the field in 1983 shipments, industry watchers consider IBM a sure bet for 1984.

A PC By Any Other Name . . .



The personal computer marketplace abounds with IBM PC competitors. The Eagle PC, Altos 586/10, Data General's Desktop Generation Model 10 are shown here.

The IBM PC cornered 20 percent of the personal computer market in its first year. Although this figure suggests that the PC is superior to its competitors, many market watchers disagree. They sum up the PC's dominance in the marketplace with the question: What's in a name?

Many non-IBM personal computer manufacturers will readily state that their products are better than the PC, and some will stay around to argue the point.

According to the marketing analysts, Apple Computers is still the leader in the field (see Figure 1). Apple II and Apple III continue to sell in the domestic market to both hobbyists and home professionals, while the Lisa, with its price tag of $10K, is clearly aimed at the business user. Does a price tag this high exclude it from the PC marketplace? "IBM is just the automatic competition," says Barry Smith, product marketing manager for the Apple Personal Office System. "Lisa is a very different machine. It sets the standard of what people will expect in coming years. Lisa's strength is its ability to develop applications much more quickly. A corresponding IBM machine is not yet available, but would cost at least as much." Smith has no way of knowing whether the arrival of the PC has hurt Apple's sales figures, but right now he is not worried. "We are selling everything we can build and are backlogged to 1984. Many people will not buy an ordinary personal computer because it is just too difficult to use . . . but no one who uses a Lisa will return to another computer. Lisa is for the people who have always hated computers."

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Figure 1: Comparative shipment figures from the Yankee group show IBM and Apple as the leaders in the personal computer marketplace. While Apple holds the lead this year, IBM will take first place in 1984.

	IBM	Apple
Market Share (Shipments)		
- to end of 1982	160,000	270,000
- to end of 1983 (projected)	600,000	700,000
- to end of 1984 (projected)	1,100,000	1,000,000
Primary Buyers	Fortune 2,000 Small Businesses	Education Small Businesses
Television Advertising		
Expenditure to end of 1982	$19.7m	$2.7m
Date Announced	August 1981	January 1981
Current Share Price	$105	$41
Growth Rate	562.5%	333.3%

PC Competitors

The Lisa may not be a direct competitor, but the IBM PC competes with Apple, Eagle, Altos, Data General (DG), and several others for the segment of the market known as the "business professional." Apple, Altos, and Data General believe that their comparative offerings are more up-market and business-oriented than the PC. But the businessman, with the check in his hand, may not agree. His decision is often based on gut feeling rather than on logical calculation. And his gut feeling may be the name IBM.

Eagle aims to compete with the PC in every category, but to offer a better machine at a lower price. "The Eagle PC has 512K RAM, is 9 pounds lighter, has 105 keys, including 25 user-friendly ones, and is quieter in operation," says Ron Mickwee, president of Eagle Computers. "The base promotional IBM is $2,559, the Eagle $1,995. But if you take a typical Eagle with two slim-line disks (which the PC doesn't have), with MS-DOS, and word processing and finance programs, we come in at $3,495, while the PC is over $4,000. We achieve a pretty consistent $500 difference." A discount of 12.5 percent is always worth a second look, but Data General claims an even greater one for its new Desktop generation Model 10, which is the bottom of a new range of three micros claimed to allow the user to make a smooth transition from the personal computer, to its 32-bit supermini, the MV8000. The user can convert "mini" software downward to run on the personal computer—either DG's or the IBM PC. Conversion is achieved through standard software and takes only a few hours.

"Yes, our Model 10 is better than the PC," says Jan Pieter, product marketing manager of Data General's technical products division. "It has two cards using an Intel 8086 and a DG microEclipse, one or two floppies, one or two 15-megabyte Winchesters, up to 768K RAM, graphics as standard, a keyboard of 128 keys, and a screen that can be green on black, or 16 concurrent colors from a possible palette of 4,095." The Model 10 is fully PC compatible, running under CP/M and MS-DOS in parallel, and under RDOS, AOS, and DG's real-time interactive operating system, MP/AOS. A Model 10 base system with 128K RAM, one Winchester, and a green on black screen with graphics costs $3,165. A similar IBM PC system costs about $800 more.

Altos Computers believes its machines address a more upstream business market than the PC, and it intends to advance this trend. The model 586/10 currently costs $7,990, but is to be upgraded shortly to a level where its capabilities will considerably exceed those of the PC. Ron Conway, vice president of marketing at Altos, states that its machine will be obviously superior. "The drive capacity is higher, the RAM/disk storage is higher, the bit-map graphics display gives higher resolution, the processor is 8 MHz, the screen is 14 inches compared to IBM's 12, the 586/10 has more function keys, a built-in calculator, and a choice of operating systems."

MANY peripheral and software companies are putting their money on IBM. It creates a self-fulfilling prophecy.

Self-Fulfilling Prophecy

In the price/performance race, the PC doesn't finish first; manufacturers and market observers agree that plenty of other personal computers can, and do, beat it. But IBM still holds a sizable corner of the market; buyers may not be basing their decisions on the evidence, but they are buying PCs. One new personal computer magazine, in its first issue, attributed part of the PC's success to the software companies, many of which want to write programs for the PC only. And, indeed, attracting software companies was IBM's intention. According to a Boca Raton spokesman, "IBM wanted the PC to be an open system and to encourage others to write for it."

Getting the software companies to comment is difficult. A spokesman for Microsoft will say only that the company respects agreements with all OEMs equally, and that most of the large, reputable software houses hold the same policy. Only the lesser ones have been trapped into concentrating on IBM. Bob Bir, manager of marketing communications at State of the Art, in Costa Mesa, California, is less reticent. "We haven't concentrated much on the PC, but from the outset we were prepared for it," he says. "Many peripheral and software companies are putting their money on IBM. It creates a



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self-fulfilling prophecy." State of the Art develops and introduces its products on the Apple and then moves them across to the IBM.

Both software houses and dealers agree that IBM's entry into the personal computer business was preceded by a brilliant marketing campaign. IBM's presence in the marketplace has validated the entire personal computer industry, and its micro will most likely dominate the market by 1984. PBX manufacturers, Rolm and Northern Telecom, quickly announced the ability to network the PC because, as they recently explained, there is more demand for the IBM PC than for any other personal computer." Demand was not as high, however, when the networking capabilities were announced. Is this another case of a self-fulfilling prophecy?

A dealer who does not wish to be named has seen his marketplace grow since the arrival of IBM. "Purchasers from corporations who might not otherwise have bought a personal computer have bought the IBM PC, but Apple sales have stayed much the same. I stock the PC, but as soon as we get them in, they go out the door, mostly to corporations."

HAD ANY other company come out with the PC, it would have failed. It's just good—adequate, not great.

Apple is considered sure to survive the coming shakeout in the professional sector of the personal computer market and can afford to state openly what others only dare to suggest. Says Smith, "Had any other company come out with the PC, it would have failed. It's just good—adequate, not great. But 95 percent of the equation is IBM. . . . IBM just delivers a piece of hardware and relies on third parties." Smith's opinion of IBM hardware is echoed by analysts and competitors. "Not wonderful" and "low tech" were two recurring comments, but many congratulate IBM on turning away from its usual policy and encouraging third parties to write the software that it is not staffed to write internally.

"IBM is more marketing-sensitive than most institutions of its size," says Mickwee. "It saw the advantage of relying on third parties and took it." It has also played on its reputation for service and support for all it was worth, although support in this end of the market appears largely uniform. Any company providing less than excellence would promptly be thrown out of business by its primary market outlet, the dealers.

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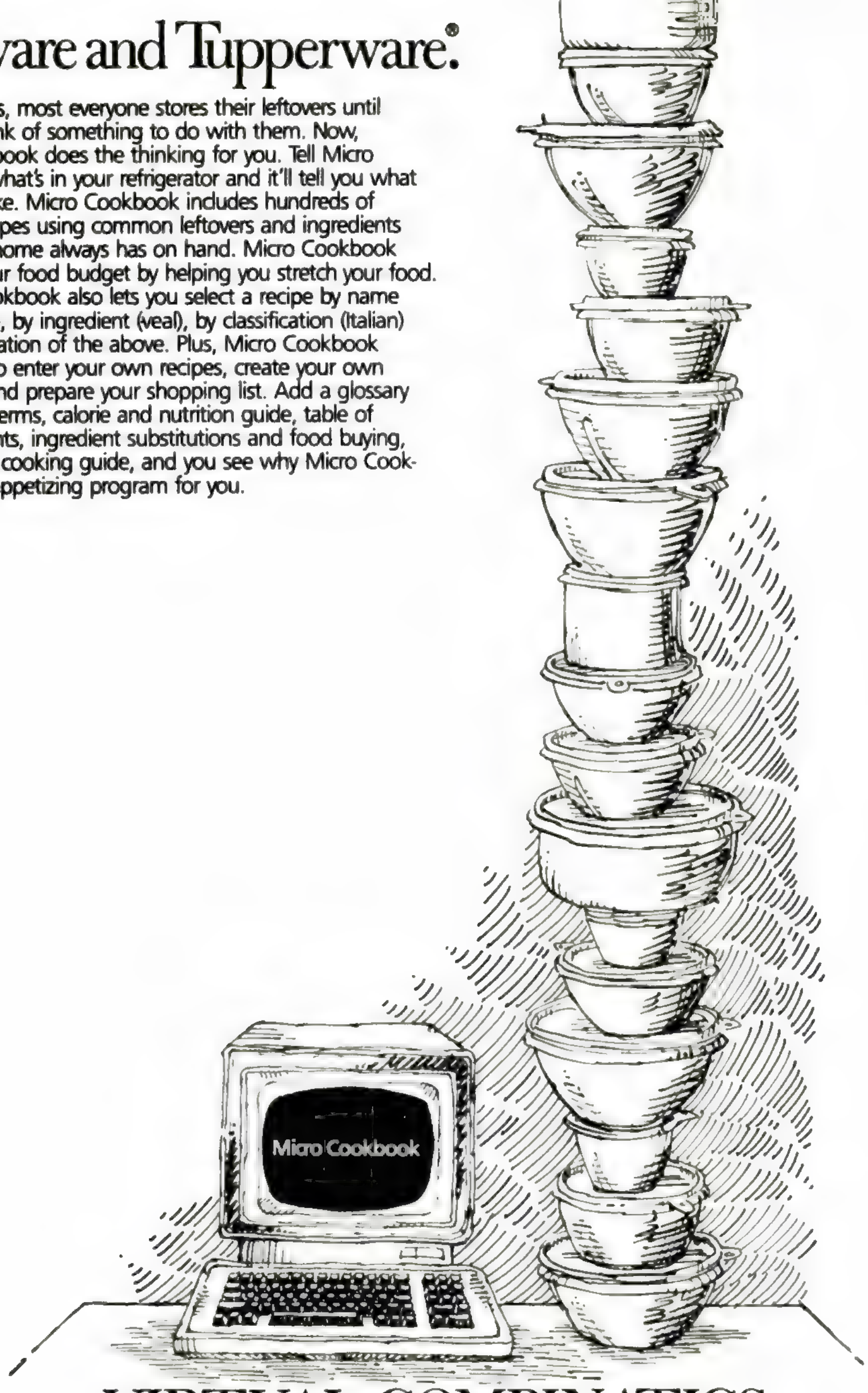
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CIRCLE 402 ON READER SERVICE CARD

IBM does not move carelessly in the marketplace. It aroused public interest for a 16-bit micro, waited, as did Data General and Hewlett-Packard, until the domestic end of the business divorced itself from the professional end, and then came in with the first 16-bit product. Leasing 500 PCs to its national accounts at somewhat favorable prices was also a shrewd way of pre-empting choice. Says Steve Ruddock of Hewlett-Packard's Personal Computer Group, "IBM put its resources into its distributing channels and advertising, not into the product itself. The software companies just saw the writing on the wall." And the buyers saw the writing on the machine. Says Ron Conway, "The success of the PC is due to three letters; I, B, and M. As the well-worn industry saying goes, 'You don't lose your job by buying IBM.' "

But are good marketing and an established name enough to justify the unquestioning acceptance of the IBM PC as the industry standard? Andrew Seybold, of Seybold Publications, says, "IBM only makes the keyboard (of the PC), which is the worst part of it. If it had any other name, it would have been an also-ran. The sad thing is that research into the 32-bit micro has been put on hold because IBM's 16-bit is now the standard. We're inundated with clones, look-alikes. If personal computers didn't have to look like PCs, there would be better machines on the market."

IBM's marketing today merely reinforces the efforts of over 20 years ago when it leased mainframes to all the major United States colleges at very favorable rates. "We all played with those machines and got used to them, and then we left college and went into business and bought them because we knew them," observes Seybold. Younger ambitious men checked what their seniors had done and simply followed in their footsteps. The conservative belief that methods of past success bring future success has created the big establishment of IBM Blue. Sighs Seybold, "I wish I could say something different but I don't think it's ever going to change."

Still, the competition is out there. Some of the other personal computers on the market are cheaper, some better, and most are at least comparable. IBM's PC is the industry standard, but a PC by any other name . . . */PC*

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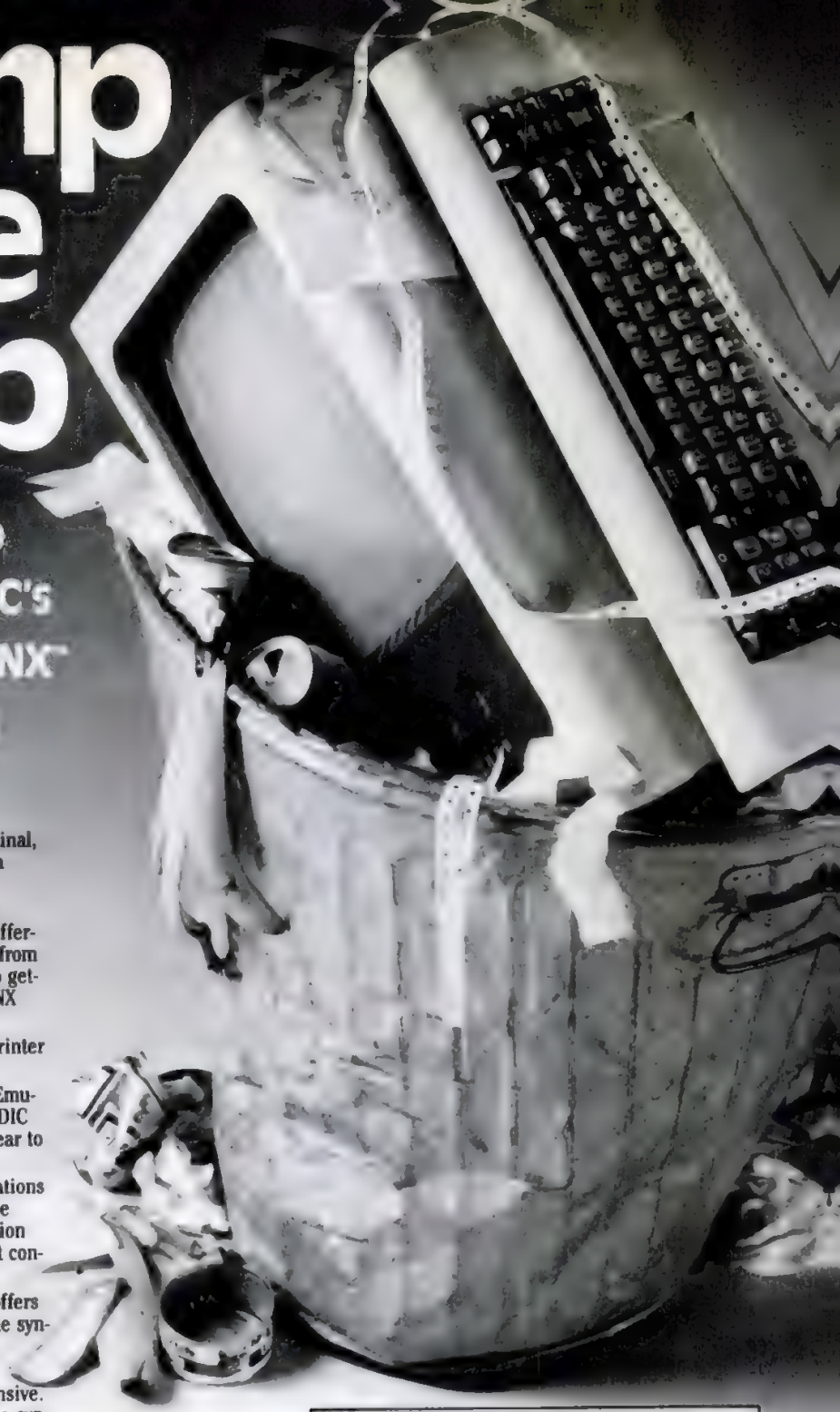
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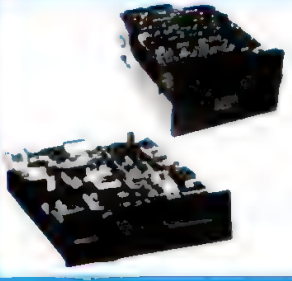
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CIRCLE 103 ON READER SERVICE CARD

You can hook up your PC to Citibank's HomeBase electronic banking network and pay all your bills without ever leaving home. But before signing up, buyer beware . . .

Home Based Banking

It's Wednesday afternoon, you're booked on a Friday night flight for a 4-week vacation to somewhere over the rainbow, and at work, everything is hitting the fan. You remember that you haven't picked up your traveler's checks—somehow a trip to the bank managed to slip through your best-laid plans. And now, the last thing you want to do is wait on line to sign your name on $1,500 worth of checks.

So, when you get home, you sit down at your PC and order the traveler's checks for delivery on Thursday. At the same time, you leave instructions to have a couple of your charge bills paid while you're away; you've already set up the payment of your rent and other regular bills. Convenient, isn't it? You, along with several hundred Citibank customers in the New York City area are using HomeBase, an electronic banking network that hooks your PC into the bank's main computer.

Citibank announced availability of its HomeBase banking/financial services program for the IBM PC in August of this year. Now in its third year, HomeBase has been available to Apple and Atari users for some time; it was originally launched on a proprietary terminal provided by the bank to 200 volunteers. (The bank pulled its terminals once the first machine-specific versions were available.)

Citibank considers HomeBase still to be in the testing stages and is working with users to refine it. Many modifications already have been made based on user feedback. The bank plans to continue its "field test," a spokeswoman said, "until we've got it to the point that we're certain that this is what the customer wants."

MANY modifications already have been made based on user feedback.

Since the refinement of HomeBase requires substantial one-on-one user contact, as well as a general survey, the bank, for an undetermined period of time, is limiting the number of customers who can enroll in the program. Citibank isn't saying when the testing phase will be over or how many new customers will be added at that time. Once the PC HomeBase network is running smoothly, the bank plans to set up the same system for another personal computer, also on a test basis.

At this point, fewer than 1,000 IBM PC, Apple, and Atari owners are plugged into HomeBase. And, yes, there are waiting lists. But the bank has as many users as it can currently manage in its field-test study.

Your Computer Does the Walking

HomeBase provides full-fledged electronic banking only between your terminal and Citibank, and between your Citibank accounts. It pays out funds from your checking account and receives deposits to all your Citibank accounts in the good old-fashioned way—by mailed checks.

But once you have it up and running, HomeBase does take a lot of the legwork and paperwork out of your banking, bill paying, and financial bookkeeping chores. For one thing, each transaction is immediately recorded, so you can flash it up on the screen. There's no need for you to plow through all that tedious paper work.

Complete and current status information is instantly available on all your Citibank accounts. In addition, you can tell HomeBase you've mailed a deposit, and it will alert you if the check has not been credited to your account within a reasonable period of time. Any activity normally conducted in any of your Citibank accounts can be handled through the HomeBase service.

The main purpose of HomeBase is to pay bills, but it throws in some useful additions. With only one instruction, it will pay such recurring bills as mortgages and rents, and the checks will go out at the appropriate time each month. You even can arrange for HomeBase to pay bills on future dates, so you're covered when you're out of town.

Facilitates Record Keeping

At any given time HomeBase will provide a record of all account activity through the previous 60-day period. You can generate hard copy on your own printer, but the bank sends a monthly statement as well.

But limiting the period to 60 days highlights the fact that HomeBase is not, as yet, a complete service. For income tax purposes, it would be far more useful to have at least the past 15 months at your fingertips. If you're income averaging or taking any depreciations, you'd probably want access to records for at least the previous 5 years.

However, electronic record keeping allows you to call up your Citibank MasterCard and Visa accounts to check on the status of purchases. It also keeps track of those traveler's checks you ordered just before your trip.

Basic Cost Is $12.50 a Month

The monthly fee for HomeBase is $12.50, regardless of how many times you access the network. Also available to HomeBase users is the Dow Jones News and Information service. For an additional $10, it provides current quotes on stocks and bonds, as well as on warrants, treasury bills, mutual funds, and options, plus historical quotes on stocks and warrants. The service also provides general and financial information on some 6,000 American firms. The option doesn't provide everything that's available on Dow Jones, but it focuses on the News Retrieval service, which provides the material most likely to be of greatest interest to the average customer. It's worth noting that Citibank will automatically provide the Dow Jones News Service, and will bill you for it, unless you inform them that you don't want it. This information, however, appears on the application in fine print and is easy to overlook.

ELECTRONIC record keeping allows you to call up your Citibank MasterCard and Visa accounts to check on the status of purchases.

To be eligible for the service all you need is a Citibank NOW or regular checking account, along with the Citicard, which comes with either one. Obviously, the bank encourages you to partake in its other banking and financial services, which include insured money market accounts, certificates of deposit, and Ready Credit and Checking Plus, each with up to $25,000 credit lines.

Security Code Protects Users

The Citicard is only one-third of the security system designed by the bank to ensure that only users, and those they authorize, can access their accounts. To get into your HomeBase records, you need three different numbers. One is the code programmed into the disk (or cartridge, for Atari owners) that the bank provides for each user. There's a different number on every disk or tape. The second number is the one visible on the Citicard. The third is the personal identification code, which the user chooses. This number, urges Citibank, should be one that you'll remember without writing down, but it shouldn't be a number, such as your date of birth, which another person could possibly obtain. Even if someone gained access to the other two numbers, he would still need your personal identification number to break into your HomeBase accounts.

In any case, HomeBase protects you; all three numbers must match up.

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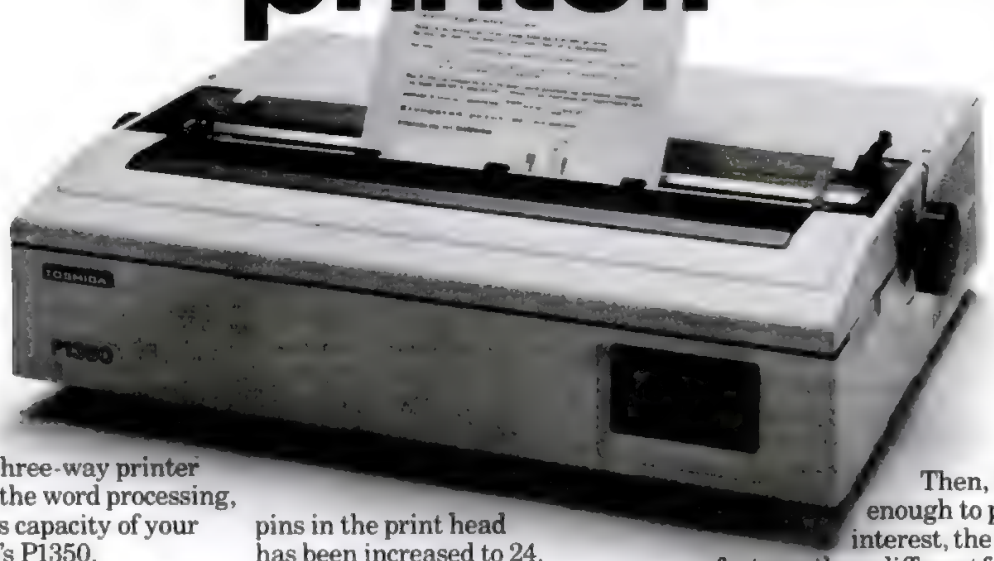
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In Touch with Tomorrow

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CIRCLE 592 ON READER SERVICE CARD

If your thirst for technology is combined with an interest in the IBM Personal

A N N O U N C I N G

PC TECH JOURNAL

FOR IBM PERSONAL COMPUTER USERS

To The Limits... And Beyond

As you well know, the IBM Personal Computer is proving to be the success story of the 1980s. Only 18 months after its introduction, the IBM Personal Computer commands almost a fifth of all personal computer sales—a remarkable achievement. At present the number of IBM Personal Computers in users' hands exceeds a quarter-million, with perhaps as many as half a million on the way in the next 12 months.

But despite its widespread public acceptance and the wealth of products now available to support it, we are convinced that *vast areas of its potential remain unexplored,* not to mention those products waiting to be introduced for which the IBM Personal Computer is the precursor.

For those serious enough about microcomputers to accept the challenge, the IBM Personal Computer represents a host of untapped possibilities.

For those with a genuine appetite for technology, there are ways of stretching the IBM Personal Computer to the very limits of its specifications. Ways to willfully expand those specifications...to throw light into the dark recesses of its complex software systems. Ways to enlarge our understanding of the equipment and to *increase its usefulness.*

If this sounds appealing, then *PC Tech Journal* is for you. For it will be the definitive source of authoritative, technically-satisfying information about your IBM Personal Computer, its future transformations and the host of products developed to support it.

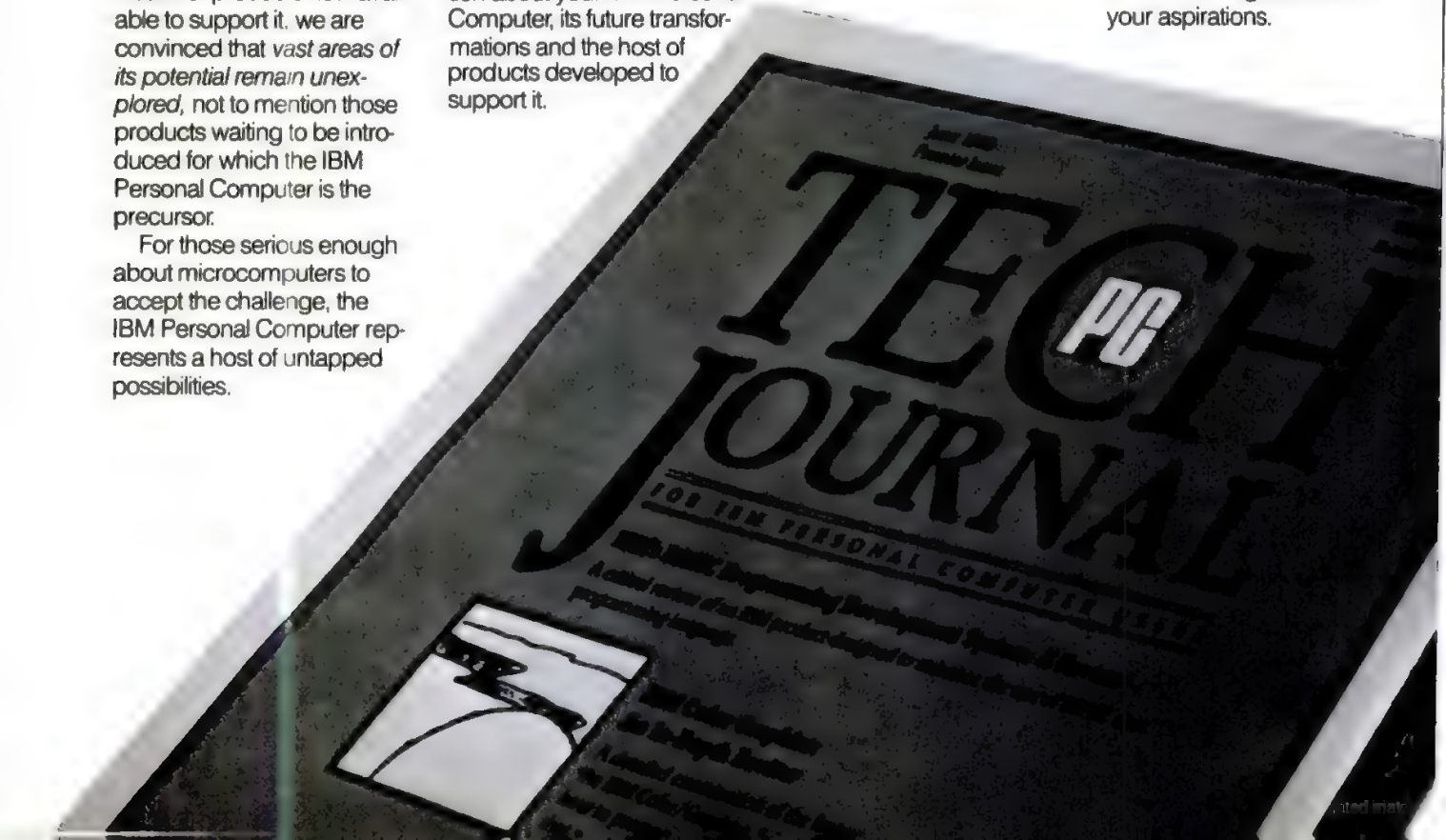
Why a Technical Journal?

The readership of *PC* Magazine has, in the last year, grown at a rate to match the success of the IBM Personal Computer itself. But as the number of committed readers has expanded, so has that portion of users who are not only interested in *output*—that is, using the IBM Personal Computer to better solve problems—but who care deeply about the *process* of the computer itself.

We consider you to be among that select group of readers. Your relationship with microcomputers, vocational or otherwise, has led you to levels of technical competence and curiosity which go far beyond problem-solving. In effect, you have a compelling interest not only in *what* your IBM Personal Computer does, but also *how* it does it and how it can do more.

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Serious programmers—both full-time professionals and non-professionals alike—with a clear interest in expanding the range and utility of software compatible with the IBM Personal Computer.

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Members of the scientific and academic community whose ability and training allow them to enhance their use of their IBM Personal Computer.

And, of course, anyone with a genuine appetite for state-of-the-art information about the emerging possibilities presented by the IBM Personal Computer.

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Moreover, as *PC Tech Journal* evolves, it is our explicit intent that you, our readers, play an important part in shaping the magazine. For we are convinced that it will be you who shape the future usefulness of the IBM Personal Computer itself.

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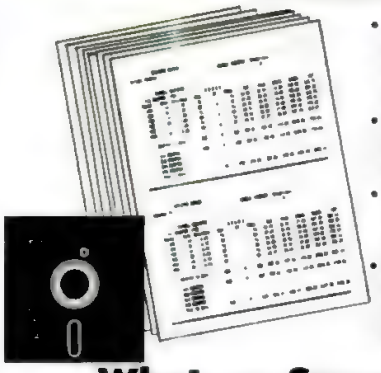
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CIRCLE 534 ON READER SERVICE CARD

Caveat Emptor

It can be argued, however, that voiceprint identification would provide even greater security. It doesn't take the imagination of high-school student computer-whiz David Lightman (in the current hit movie *War Games*) to think of the ways intruders can access accounts from electronic terminals, whether electronic teller machines, home computers, or whatever electronic banking technology the future may bring. With many banks now developing electronic banking programs, security problems conceivably could reach epic proportions.

There's reason for concern on the part of consumers, since under the Electronic Funds Transfer (EFT) Act and Regulation E of the Federal Reserve Board, users of EFT procedures have less protection from, and potentially more liability for, error and theft than those using conventional banking services. Virtually the only time a customer is not liable for at least some part of the loss is in the case of an unauthorized transfer by a bank employee. And, unless you check your account status every day, you can never be sure that it hasn't been tampered with. In conventional banking transactions, where you actually sign a check taken out of your checkbook, the general thrust of law and practice is that if

EVEN IF someone gained access to the other two numbers, he would still need your personal identification number to break into your HomeBase accounts.

the bank pays a forged check out of your account, it is liable, not you, the consumer. The bank is supposed to check the signature. But when the check goes out directly from the bank, via an electronic banking network, you lose the level of protection provided by the paper itself.

Add to this the relative fuzziness of many definitions and provisions of the

law and that electronic banking is so new that there's little history to go by. Consumers considering using the latest in up-to-date home banking should probably take *caveat emptor* very seriously.

Necessary Hardware

Aside from the Citicard, the only other requirements are certain pieces of your PC system. HomeBase requires 48K RAM and

CAN HOMEBASE be used with IBM compatibles? Citibank's answer is a reluctant "probably."

an asynchronous communications adapter, with an RS 232 interface. Citibank's disk drive specs call for a single-sided drive (160K) or a dual-sided drive (320K) with an appropriate disk drive adapter, and either DOS 1.0, 1.1, or 2.0. For autodialing, you need a DC Hayes Smart modem, an autodialing Novation AutoCat with a modified cable connection, (pin 4 wired to modem pin 25), or any RS 232 Bell 103 compatible, 300-baud full duplex only, and manual dialing only. Monitor and printer choices are up to you.

A final question: Can HomeBase be used with IBM compatibles? Citibank's answer is a reluctant "probably." But the bank's contract is with IBM, not with Compaq, Hyperion, or Eagle. So, if a potential HomeBase user applying for the service happens to let it slip out that he's got a compatible, and not the PC itself, well . . .

The Wave of the Future

When Citibank perfects HomeBase with the help of user feedback, it will lift its limited enrollment and begin a test-condition period with other personal computers. Other major commercial banks soon may offer this service, too. Clearly, electronic banking is the wave of the future, but before you opt for home-based banking, remember that the waters are still untested. It's an area where changes are called for in order to provide greater customer protection. */PC*



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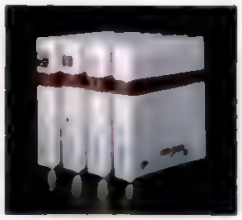
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CIRCLE 185 ON READER SERVICE CARD

THE ULTIMATE SOLUTION TO THE PC EXPANSION DILEMMA.

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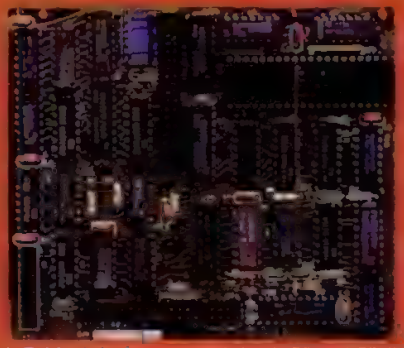
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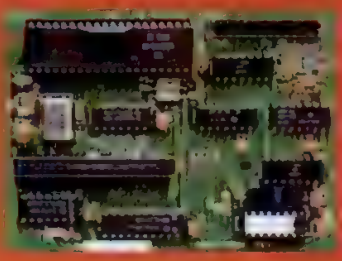
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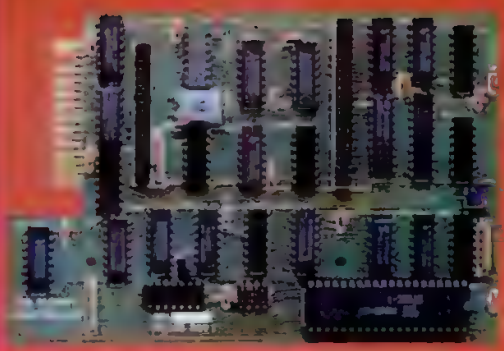


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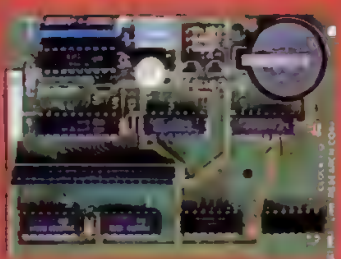
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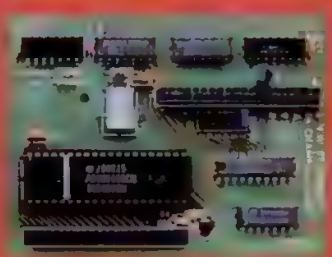
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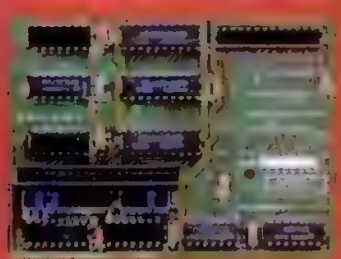
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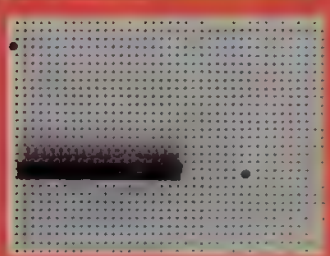
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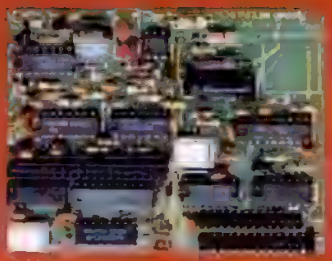
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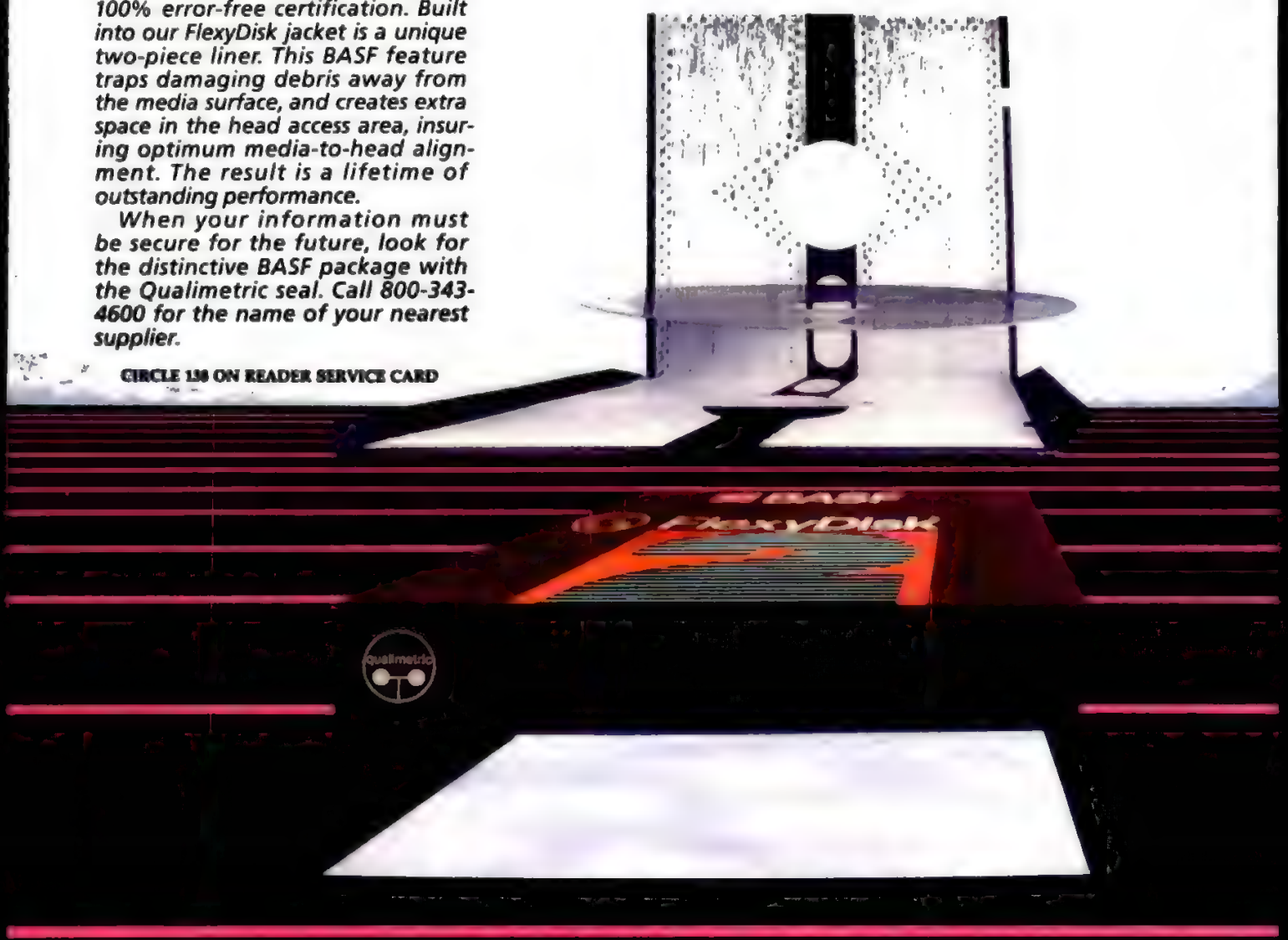
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This One Decision Saved our Business and Grossed over $1,000,000. in Sales

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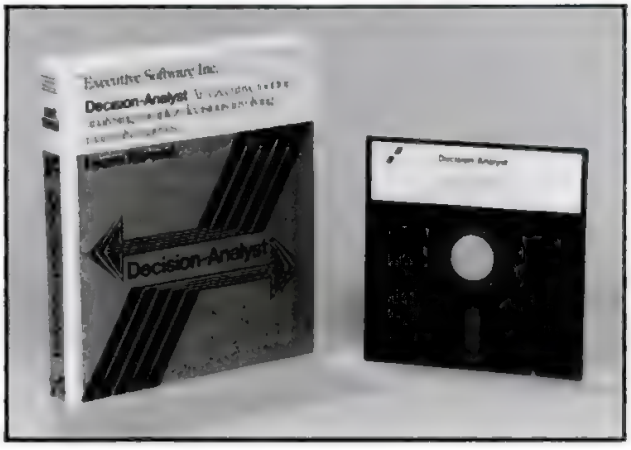
By early summer, our order book was bulging. It really looked as if our off-season sales and production problems were over. Then just as quickly the roof fell in. Gas shortages devastated the recreational vehicle market overnight. And our order book for over two million dollars worth of the new product disintegrated.

Faced with a fall and winter of virtually no sales, many thousands of dollars of unneeded parts and excess production staff, I had no choice but to shut down the production lines. And if a solution to our problem couldn t be found, the business itself was in jeopardy.

A life saving decision

I spent many sleepless nights trying to come up with a solution to this nightmarish situation. Then I remembered a course I had taken in decision analysis. I spent the rest of that night reviewing course material and other books I had bought on the subject. The next day,I called an emergency meeting.

Using the decision making techniques I had learned, we spent the rest of the week searching for and analysing potential solutions. The net result was that not only was the company pulled back from the brink of destruction, but we added over $1,000,000.00 in gross sales during that off-season.



A way of life

From that point on, almost every critical decision (and there were many) regarding new products, marketing channels, pricing, advertising, production equipment, engineering projects, received this same type of analysis.
Although the process was very time consuming and clumsy, because it had to be done by hand, our decisions were much improved. And there were some real benefits that we had not anticipated.

1. Our understanding of each problem was greatly increased.
2. We uncovered opportunities that we would not have thought of in any other way.
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Any complex decision usually requires multiple revisions to criteria, alternatives, weights and values assigned to them. If done manually, the ordeal of rewriting, recalculating and redocumenting tends to discourage revisions, thus producing poor results.

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Comprehensive but easy to use

Decision~Analyst is probably the easiest program you'll ever use. You can literally learn to operate the program using only the 'help' screens. But it comes with a thoroughly indexed manual which includes many pages of examples plus a step by step guide to the decision making process.

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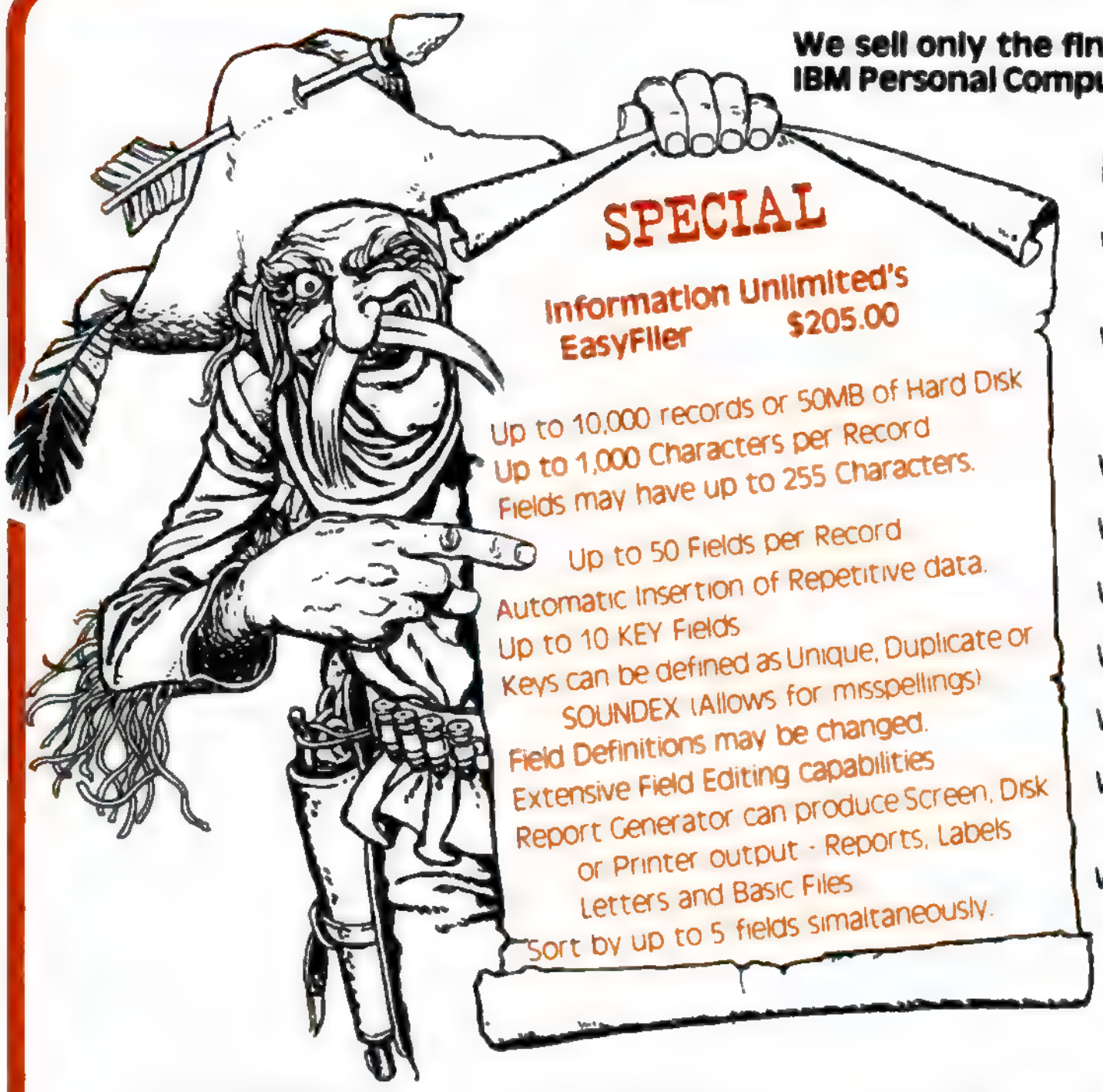
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CIRCLE 615 ON READER SERVICE CARD

Personal WordPerfect is a new entry in the word processor sweepstakes, one that is aimed at the entry-level IBM PC user. New may be the wrong term to use, however, as *Personal WordPerfect* is really just the younger sibling of the more powerful Satellite Software International (SSI) product, *WordPerfect*. As such, *Personal WordPerfect* boasts most of the significant characteristics of *WordPerfect* at a considerably lower price.

For someone who uses *WordPerfect* regularly, the tendency to compare the two products is almost overwhelming, but any comparison should take into account the $300 price difference. *Personal WordPerfect* nevertheless holds its own in such a comparison, even though a number of the powerful features from *WordPerfect* have been excised.

Getting Started

Personal WordPerfect (hereinafter *PWP*) comes not in the now-familiar three-ring binder and slipcase but in a spiral-bound manual that lays flat when opened. The disk envelope affixed to the last page of the manual contains one single-sided, 160K disk. Also provided are a paper template to surround the ten function keys and some slips of paper with update information. The slips indicated that Version 2.30 of the program was enclosed and provided some guidelines regarding IBM-DOS 2.0 and the use of a color display. A short, simple, and easy-to-understand "License Certificate" form also is included. Once the two-part form has been filled in, the second copy, actually a prepaid postcard, is mailed to SSI.

The manual is typeset, clearly written, and well formatted and organized. It covers the basics of word processing with *PWP*; how to get help; and the typing, editing, formatting, printing, and filing of documents. The last chapter explains how to install and run the program. It might have been better to place the start-up information at the beginning of the book, since one logically might expect such matters to be of immediate interest to a new user.

One vital area of information is missing: nowhere does the document clearly state what hardware configuration is required to run *PWP*! The answer: 128K of memory, two disk drives (it will work on one drive and an electronic disk), and any 80-column display.

Two versions of the program are supplied. One incorporates a feature that SSI calls "Flash." When used with the IBM monochrome display, this version offers much more rapid screen display than the standard version. If a color display or an IBM-compatible computer is being used, the standard version is required.

Two batch files are included on the disk to facilitate setup of a *PWP* working disk. MAKE_PWP.BAT sets up the standard version, while M_PFLASH.BAT sets up its namesake. Unfortunately, the Version 2.30 of the documentation reviewed here did not explain the use of these batch files, and although the published setup procedure will still work, it will leave unnecessary files on the working disk.

Copyri

Once a working disk has been prepared, the program is invoked with the DOS command PWP. It also is possible to enter a system configuration menu by giving the command PWP/S. In this case, a number of default settings can be established or a previous set of defaults changed. Again, the documentation provides a slightly different explanation of this process, and does not mention the PWP/S option. One of the slips of paper does mention /S, but the reference in these instructions is to *WordPerfect*, not *PWP*, a source of possible confusion.

These flaws in the document are unfortunate, because the manual is a definite improvement over previous SSI efforts. A misunderstanding of the setup instructions, though not fatal, is certainly frustrating. This oversight is likely to alienate many prospective *PWP* users—a tragedy, since nearly everything else about *PWP* is good!

Online with PWP

When the program is finally running, the user is presented with a blank screen, except for a message in the lower right-hand corner showing the page, line, and column position of the cursor. *PWP* uses a flashing underscore to display the cursor, which is initially in the upper left-hand corner of the screen. At this point, the user simply can begin to type.

The first page of the manual explains the opening screen display and gently nudges the user into action with a simple, three-line typing exercise. The next 2 pages teach the user how to move the cursor, how to delete text, and how to add text. Page 4 explains how to print. Pages 5, 6, and 7 explain how to save and retrieve text and how to exit the program.

If that seems short, it is. The entire first chapter can be read in five to ten minutes. Chapter 2 is about the Help key, and what to do if you type something wrong; each topic is treated in one page. The rest of the manual follows the sequence laid out in the first chapter: typing, editing, formatting, printing, and filing.

Help

One of the nicest features of *PWP* is the built-in help feature. It is invoked by depression of a function key and displays the message "Help with what?" The proper response is the depression of any key. If the key pressed is the Help key, or a key that is meaningless to the program, *PWP* explains how to use the Help key properly. If a function or cursor key is depressed, information on its use is displayed.

The information displayed is quite complete. When I first used *WordPerfect* several years ago (on Data General equipment), the SSI documentation was complete, but terribly written and almost impossible to use. By reading the manual, I learned how to use the Help key. Then I used the Help key to learn how to use the program. I recommend that *PWP* users take the time to request Help on every key on the keyboard (including the Ctrl, Alt, and Shift combinations). Although this might seem tedious, there are a few omissions in the manual that are explained by Help. This is balanced by a few omissions online that are explained in the manual. (For example, the use of the left and right cursor keys with the control key is not explained.)

CHANGING the disk default does not affect PWP's ability to find its own files.

Typing, Editing, and Printing

In my experience, the first-time user wants to get something typed and see it printed. *Personal WordPerfect* makes this almost painless.

Entering text is easy. Once the initial screen has been displayed, you simply can type away. Naturally, *PWP* will wrap at the end of lines. Editing text is just as easy. You position the cursor, use either of the delete keys to delete text, and type to insert new text. The program is in insert mode to begin with; this means that anything typed will be placed at the cursor, and text to the right of the cursor will be displaced to the right.

Moving the cursor in *PWP* is a dream. SSI has devised the finest, most elegant navigational scheme around. The cursor keys have the expected effect: they move one unit left, right, up, or down. The horizontal units are characters, and the vertical units are lines. If the cursor depression is prefixed with a Home key, the cursor will move to the appropriate edge of the display screen. If two Homes are typed, the cursor will move to the appropriate edge of the document (that is, the beginning or end). As if that were not enough, the Esc key can be used as a prefix to move the cursor eight units, and the Ctrl key can be used with the right and left arrow keys to move the cursor word by word. But wait . . . there's more! There is a Goto key (Ctrl-Home) that can be used with the up and down arrow keys to move the cursor to the top or bottom of the current page. Or, the Goto key can be followed by a number, in which case the cursor will move to the top of the page of that number. It can also be followed by some other character, in which case the cursor will move forward to the first occurrence of that character. (The cursor does not move if the character cannot be found.)

The PgUp and PgDn keys on the PC are used for those functions by *PWP*, positioning the cursor at the top of the previous or the next page, respectively. The minus and plus keys on the far right of the IBM keyboard move the cursor to the top or the bottom of the screen; they have the same function as the up or down arrow prefixed by one Home, but they are easier and quicker to use.

That may seem like quite a bit to remember, but it takes only a little practice to train one's right hand. Once learned, navigation is hard to forget, an important advantage.

Printing is the one rough spot for the beginner. The main reason is that the manual refers to a key called Print, but nowhere on the keyboard (or the SSI template) can such a key be found. The key in question is the IBM's PrtSc key, used in conjunction with the Ctrl key. If you experiment with Help, you will find the key. It also can be found if you refer to the chart on the inside front cover of the manual, which gives the IBM designation for all *Personal WordPerfect* key assignments.

Also, attempts to print before printer definitions have been established will fail, although *PWP* does explain what you must do to recover. It is possible to redefine the printers from within the program, a delightful feature, and one I think might be unique to SSI products.

PWP claims one very powerful printing feature. Unlike many word processors in its price range, it prints in the back-



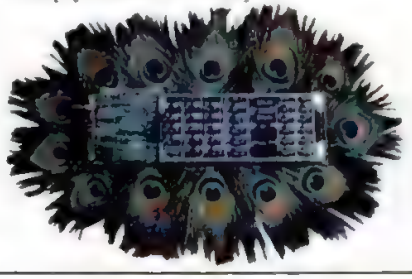
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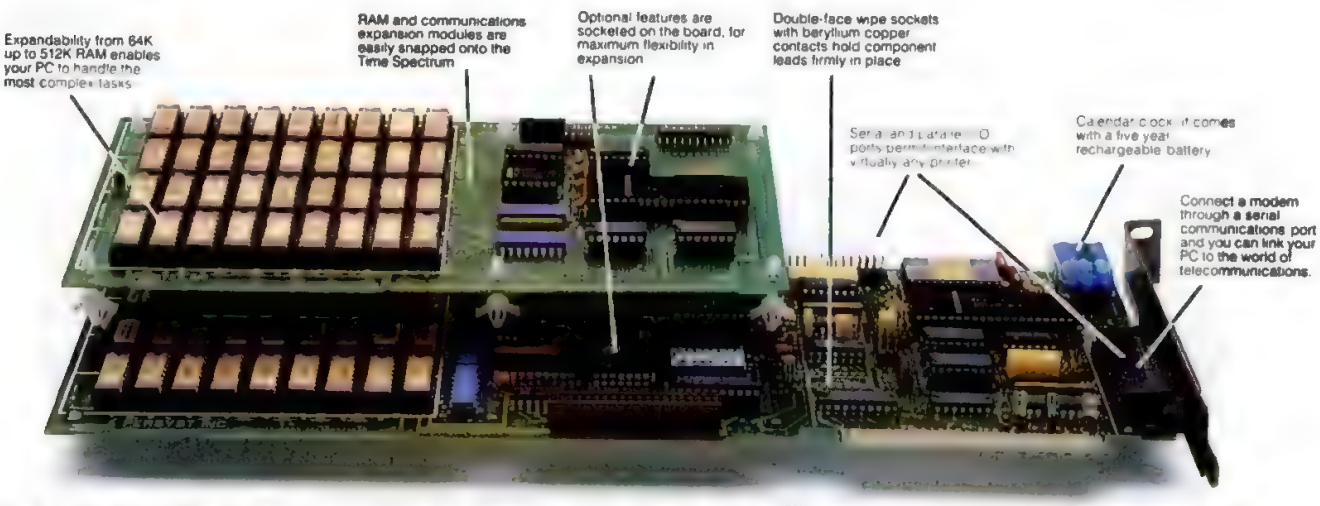
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ground and allows editing of the same or of a different document to take place at the same time. Print requests are maintained in a queue; because this list is kept in a file on disk, the number of files awaiting printing can be quite large. But *PWP* will not allow the user to exit to DOS while printing is in progress. If it is absolutely necessary to leave *PWP*, printing can be suspended and will resume automatically when *PWP* is next invoked, a feature made possible by the disk queue.

The program supports the most popular letter-quality printers as well as the Epson (IBM) printer. For personal use, the list is somewhat limiting, since the Epson is the only inexpensive printer on the list. However, this limitation can be overcome by defining your printer as a simple line printer; in this case, *PWP* does not output any special printer codes and accomplishes its task by brute force. This setting works for most dot-matrix printers.

PWP can be configured to support two printers at the same time and can be printing to each while editing continues. A third printer can be defined; this special setting (called printer number 3) directs the output to a file. Printer 3 can be defined as any printer *PWP* supports, so output can later be printed on the desired printer. Opting for printer 3 is also the method for obtaining a straight ASCII (all text, no control codes) version of the file.

The printer configuration process also determines how the printer is connected to the computer. *PWP* can therefore speak directly to any port and does not require device redirection, as provided by the DOS MODE command.

Formatting

Even without some of the more powerful formatting capabilities of *WordPerfect*, *PWP* can be considered rich in features. Margins, tab settings, and line spacing can be changed anywhere in the document. The right margin can be justified or not and can be changed anywhere in the document. A temporary margin can be set at any tab stop and maintained as long as desired. Boldface and underline commands are simple and the results are displayed on the screen. Any line can be centered; unlike many other programs, the fact that the line is centered is remembered from session to session. Decimal tabs allow the easy alignment of numeric columns. The page length can be varied from 1 to 108 lines and the number of lines that will be used for printing set to any value smaller than the page length. The page number can be reset to any value from zero up at any time. Subscript and superscript are supported. PWP also offers a hyphenation range; it can be made to hyphenate more, or less, as the user desires. It supports headers and footers with an option of embedded page numbers.

Most of these formatting features are

Personal WordPerfect Measures Up

A feature-by-feature comparison of Personal WordPerfect with a hypothetical model word processor highlights its strengths.

Feature	Personal WordPerfect
For letter writing:	
Simplicity	More complicated than average
Easy to print	Yes
Performance	Very good
Inexpensive	Moderate
For manuscripts:	
Human factors	Above average
Navigation	Superb
Ability to handle documents of arbitrary size	Yes
Block operations	Yes (cut and paste via files)
Search operations	Yes (forward only)
Formatted on-screen display	Excellent
File system operations from within word processor	Yes
Headers and footers	Yes
Margin and spacing control	Yes
For technical or formal papers:	
All of the above plus:	
Footnotes	No
Temporary indentation	Yes
Search-and-replace operations	Yes
Superscript and subscript capability	Yes
For all applications:	
Excellent error detection and recovery	Yes
Ability to handle "disk-out-of-space" condition	Yes
On-line help facility	Excellent
Quick reference card	No
Sample files included with purchase	No
Vendor "hotline" for assistance	Yes
Other considerations	
Your printer supported	Could be better
Flexibility of printer choice	Excellent for expensive printers Poor for inexpensive printers
Ability to read straight text files (data import)	Yes, requires manual formatting
Ability to write straight text files (data export)	Yes, requires manual formatting
Display and print bold and underlined text	Yes
Control of single sheet printing	Yes
Ability to embed arbitrary printer control codes	Excellent

—W.F.

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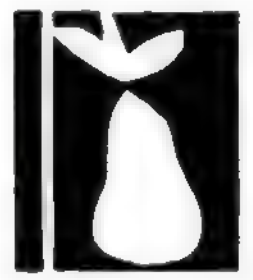
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Figure 1: A listing of WordPerfect features that are not included in Personal WordPerfect

Advanced formatting
- Advance line
- Center over columns
- Center page top to bottom
- Conditional end of page
- Double underline
- Flush against right margin
- Left margin release
- Simultaneous left/right indent
- Text columns (newspaper style)

Extended operations
- Reverse search
- Search and Replace with confirm
- Macros
- Automatic block move (Move key)
- Math mode
- Range append
- Range uppercase/lowercase
- Sheet feeder support
- Dictionary (spelling checker)
- Merge

obtained through the depression of one or two keystrokes, although some require selecting items from a menu. Even the most complicated are not difficult to invoke.

PWP's ability to alter formats at any time is one of its most powerful features. Keep in mind that anything can be changed at any point in the document. The flexibility of *PWP* is astounding.

Printer Control

Whether *PWP* supports your printer or not, there often are times when you want your printer to perform its own special tricks. *PWP* is in good control of the Epson and can deliver a number of fonts without much prodding. Since arbitrary printer codes can be embedded in the text with the Print Modes key, most printer features can be accessed. I have used the feature to obtain italics on my Epson, something that *PWP* cannot do by itself.

File Management

PWP has a very extensive set of filing capabilities. Its file management menu can be used to display a list of files on a particular drive or, in the case of DOS 2.0, a directory. DOS-style filename templates can be used to list a subset of files. When this menu of files is displayed, the cursor keys can be used to move a pointer to any one of the files; the file can then be retrieved, printed, deleted, or renamed.

PWP also can be told which drive or directory is its default, the equivalent of switching disk drives in DOS. Changing the disk default does not affect *PWP*'s ability to find its own files.

The program has been thought out carefully in two other ways. First, the user always is warned before a file on the disk is overwritten, and the opportunity to stop is offered. Further, if the user opts to overwrite the file, the original is held in a temporary backup file until the new version has been successfully written to disk. Second, the dreaded "disk-out-of-space" condition is handled properly; the user is given the opportunity to insert a different disk.

PWP's ability to alter formats at any time is one of its most powerful features.

Summary

Figure 1 lists those features that *WordPerfect* provides beyond those found in *Personal WordPerfect*. I provide the chart not to diminish *PWP*, but as a guide to which features are sacrificed in the less expensive product.

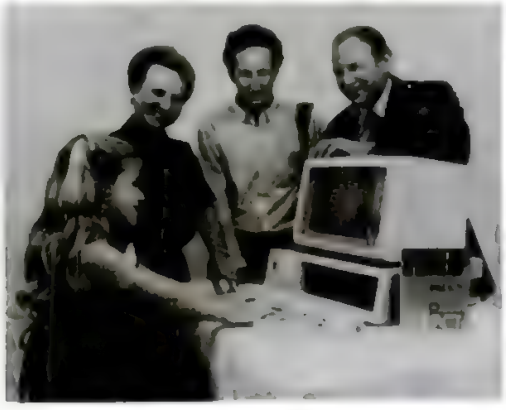
There is one new feature coming for *PWP*, which should be available as you read this. SSI's dictionary, now a standard feature with *WordPerfect*, will become a $95 option with *Personal WordPerfect*.

Choosing a word processor is a chore. I have prepared a list (taken from the *1983 Creative Computing Software Buyers' Guide*) of features to look for and marked it according to *PWP*'s features and capabilities. I think the chart speaks for itself. It shows *PWP* to be fully featured and very powerful, especially in light of its $195 price. */PC*

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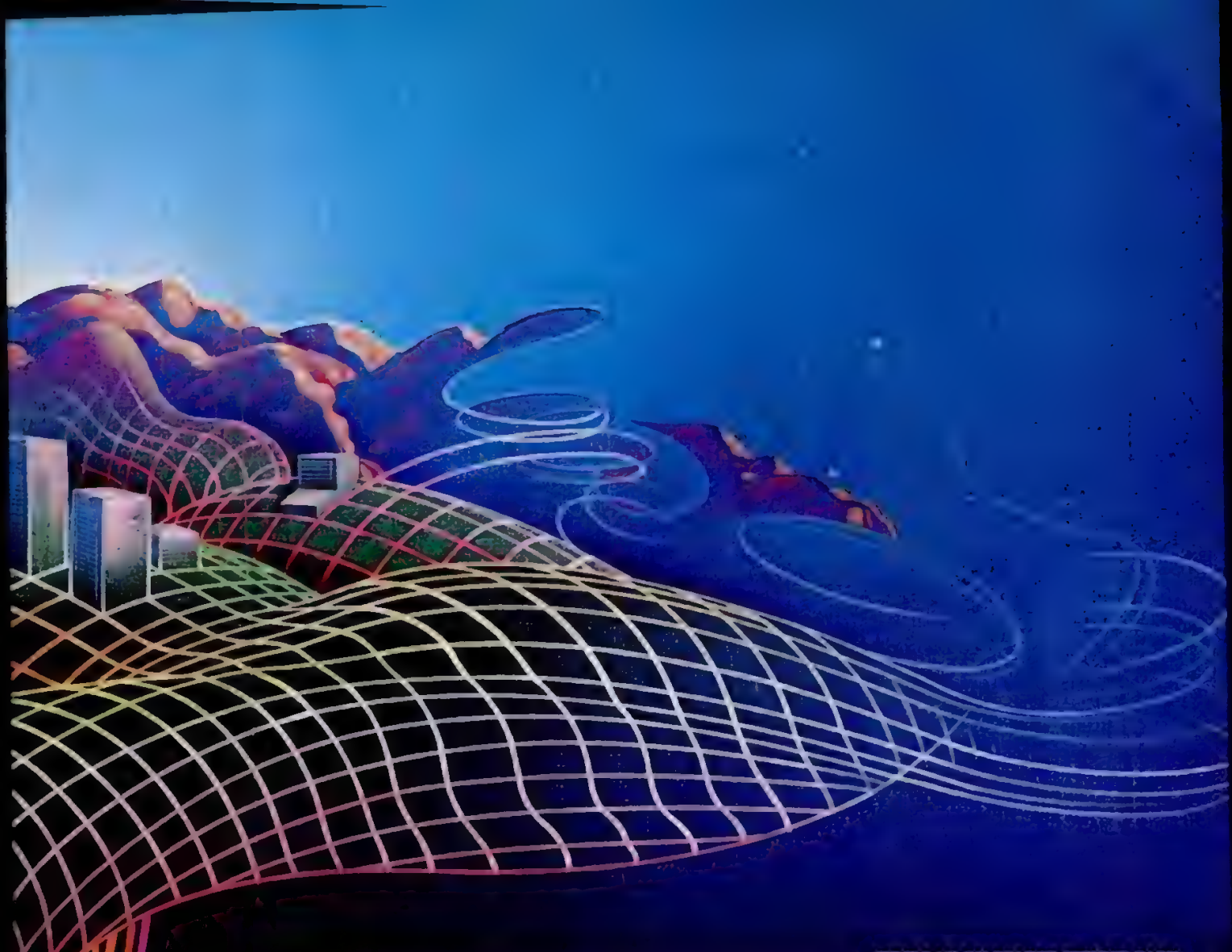
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Porting programs down from mainframe to micro is just one in a series of trends that will pave the way for custom-designed, task-specific software for every conceivable business application.

Software Migrations

When the PC was unveiled 27 short months ago, microcomputer software authors and publishers scrambled to move their word processors, database managers, spreadsheets, games, modeling programs, and spelling checkers to the new machine with its more powerful 16-bit central processing chip and operating system.

The race to market PC versions of existing programs could be called the first software wave and included such manufacturers as MicroPro with its *WordStar* family of programs, Sorcim with *Supercalc*, VisiCorp with its *Visi*-series of business packages, Ashton-Tate with *dBASE II*, and, of course, MicroSoft with the MS-DOS operating system and its languages.

In retrospect, the crash efforts of these companies were only the first in a series of software waves. A second wave, software written specifically for the start-up companies such as Lotus *(1-2-3)*, Context *(MBA)*, and Information Unlimited Software *(Easy Writer I* and *II)* is upon us now, and the third and fourth waves of software are following closely behind. The fifth wave of software, while still several years away, is in its beginning stage.

The third wave, which could be called the mainframe migration, will bring programs currently running on mainframes and minicomputers to the PC. This will offer small businesses and individuals unprecedented personal computing power—more power than anyone could have imagined a few years ago when the first microcomputers were marketed for hobbyists and small business owners.

The marketing of mainframe software has been relatively slow for several reasons. First, 2 years—nearly a generation in today's microcomputer world—is barely enough time to design a sophisticated program for a mainframe computer. Second, the theoretical ability of the IBM PC to manage 1 megabyte of on-line memory and significant amounts of storage was not fully realized until the introduction of the IBM XT with its 256K RAM motherboard and 10 megabytes of dependable storage. Third, reliable software tools, such as FORTRAN and COBOL compilers, needed to transfer the source code of sophisticated mainframe programs to the PC, have only recently become available.

The fourth wave of PC software, which could be called the mainframe connection, will allow users of IBM PCs to capture small portions of huge mainframe databases and to use the data for analysis and modeling. Eventually, users will be able to obtain data from a mainframe, make changes, and return the data, at which point data processing managers will supervise its reinstallation into their huge databases.

The Mainframe Migration

Mainframe software manufacturer Primavera Systems, Inc., of Bala Cynwyd, Pennsylvania, is looking eagerly at the PC marketplace. As is typical of many of the mainframe software houses, this company has been hard at work in recent months creating a PC version of its critical path analysis system called *Project Management and Control (PROMAC)*, which will soon be available. *PROMAC* has been in use on the IBM 370 for nearly a decade.

The PC product, which will be called *The Primavera Project Planner*, will be menu driven. Changes to information contained in the software will be made through screen editing. Screen "win-

dows" will allow users to look at different portions of the project simultaneously.

Richard K. Faris, vice-president of technical development for Primavera Systems, explained, "We know that a program written for a mainframe will not fly in the micro world, because people demand programs that are easy to use. Mainframe programs are almost never easy to use."

Faris acknowledged that there were several available microcomputer control program management (CPM) and project management programs: "There are a number of very small unsophisticated systems handling several hundred tasks. But we handle up to 10,000 tasks on an XT with multiple windows with which you can view the interaction between tasks and adjust information about the nature, cost, and timing of the task."

With MicroSoft's 3.1 FORTRAN 77 (which Faris preferred to IBM's version), conversion of the project manager from mainframe to PC was not difficult. "I converted the program once before to a $500,000 Data General 16-bit Eclipse. The conversion to the PC was easier, and the PC version runs more efficiently."

Faris said his target market was large companies that use project management and are buying PCs by the score. "Those that have used project management programs on a mainframe will be surprised to find the capabilities that we offer. We provide 90 percent of the functionality for 5 to 10 percent of the price. We feel we can sell the planner at about $2,500, because the PC market is exploding. The relative portability and independence of the PC also provides an opportunity to take data directly to job site," he added.

Primavera also expects to sell the system to smaller businesses, which previously may have been unable to afford a mainframe-quality project management program.

Regarding the IBM PC, Faris said, "I love it. I've been programming since 1966, beginning on an ancient IBM. I think that mainframe computing is an archaic way to deal with computers. I got used to using minicomputers. The IBM XT is very much akin to using a minicomputer, but with the XT, I never have to share with anyone else.

"In my opinion," he continued, "the future of computing is networking with PCs and using mainframes for specialized tasks, such as large-scale data extraction and number crunching. Many applications on mainframes could be done better on the PC."

Mini Migrations

Software also is coming to the PC from the minicomputer world. One recent entry to the increasingly crowded PC database management field is *Sequitur*, billed by its creator, Pacific Software Manufacturing Company of Berkeley, California, as "the first-ever database word processor system."

Sequitur was originated on a Digital Equipment Corporation (DEC) VAX PDP-

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11 about 3 years ago and soon thereafter was moved to the 68000 with the UNIX operating system.

THE FUTURE of computing is networking with PCs and using mainframes for specialized tasks.

According to Tim Colstad, vice-president of Pacific Software, the *Sequitur* is a powerful relational database with a text-handling package. It is designed following the "query-by-example" concept developed by IBM for its *Sequel* database. (The well-known timesharing program *Oracle* is also modeled after *Sequel*.)

One of the interesting features of the word-processing portion of *Sequitur* is that each cell can represent a window into a potentially larger text. Since *Sequitur* uses "query by example," the user gives the program an example of the type of data he wants brought to the screen.

Because *Sequitur* is written in C, moving it to the IBM PC was not difficult, according to Colstad. He added that the PC version of *Sequitur*, although less expensive than those for the 68000 or PDP-11, is comparable to the version of *Sequitur* designed to run on the VAX and the Fortune 32/16. "In fact, the word-processing portion is better on the IBM. In the micro world, people expect a program to do everything, so we are going to try to accommodate them," he said.

Sequitur, however, was not intended as a be-all-and-end-all program. "We are not going to try to sell it as a spreadsheet," continued Colstad. "I think it wouldn't be fair to the user."

What *Sequitur* will do is impressive. It includes the functions Selection, Join, Sort, Union, Intersection, Difference, Unique, and Duplicate. The Forms command allows you to prepare form letters and documents containing data from the *Sequitur* data tables. The word processing functions include word wrap; text block move; and move by character, word, sentence, paragraph line, or table entry. Search and replace commands accommodate wildcards; mail-merge functions are included.

Like the *Primavera Project Planner*, *Sequitur* for the PC will cost less than 10 percent of the price of the same program running on a mini. The suggested retail price for the product, scheduled for an early fall release, is $795. This compares to a $12,000 price tag on a PDP-11 and $1,395 on Fortune 32/16. Of course, the latter two computers can support many users.

The Mainframe Connection

The fourth wave, which could be called the mainframe connection, will give PC users in a business environment the ability to access and modify information from a time-sharing network or main-

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DIGITAL RESEARCH

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frame database. Major mainframe data processing software companies from the mainframe world, such as Informatics General Corporation, Cullinet Software, Inc., On-Line Software International, and McCormack & Dodge Corporation, are offering PC users access to their data and are competing with one another for the most effective and easy-to-use system. Each of these mainframe software giants has entered into working arrangements with major microcomputer software publishers.

Informatics, for example, has developed a program with VisiCorp called *VisiAnswer*. *VisiAnswer* is the microcomputer portion of the joint program. For the mainframes, Informatics is supplying a slightly less powerful version of its *DB Answer*, a $65,000 IBM mainframe information retrieval system. *VisiAnswer* is designed to interface with *VisiCalc*, VisiCorp's software flagship with its 250,000 users, and *VisiOn*, its still unreleased operating environment for the IBM PC.

The VisiCorp/Informatics game plan is to provide two things: the communications and conversion software necessary to allow an intelligent exchange of data to take place between a PC and a mainframe computer; and the ability for the microcomputer user to query the mainframe database, identify himself (that is, pass the required security clearance), and capture (download) data in a form that can be immediately used or stored for use with a *VisiCalc* model.

SEQUITUR is a powerful relational database with a text-handling package.

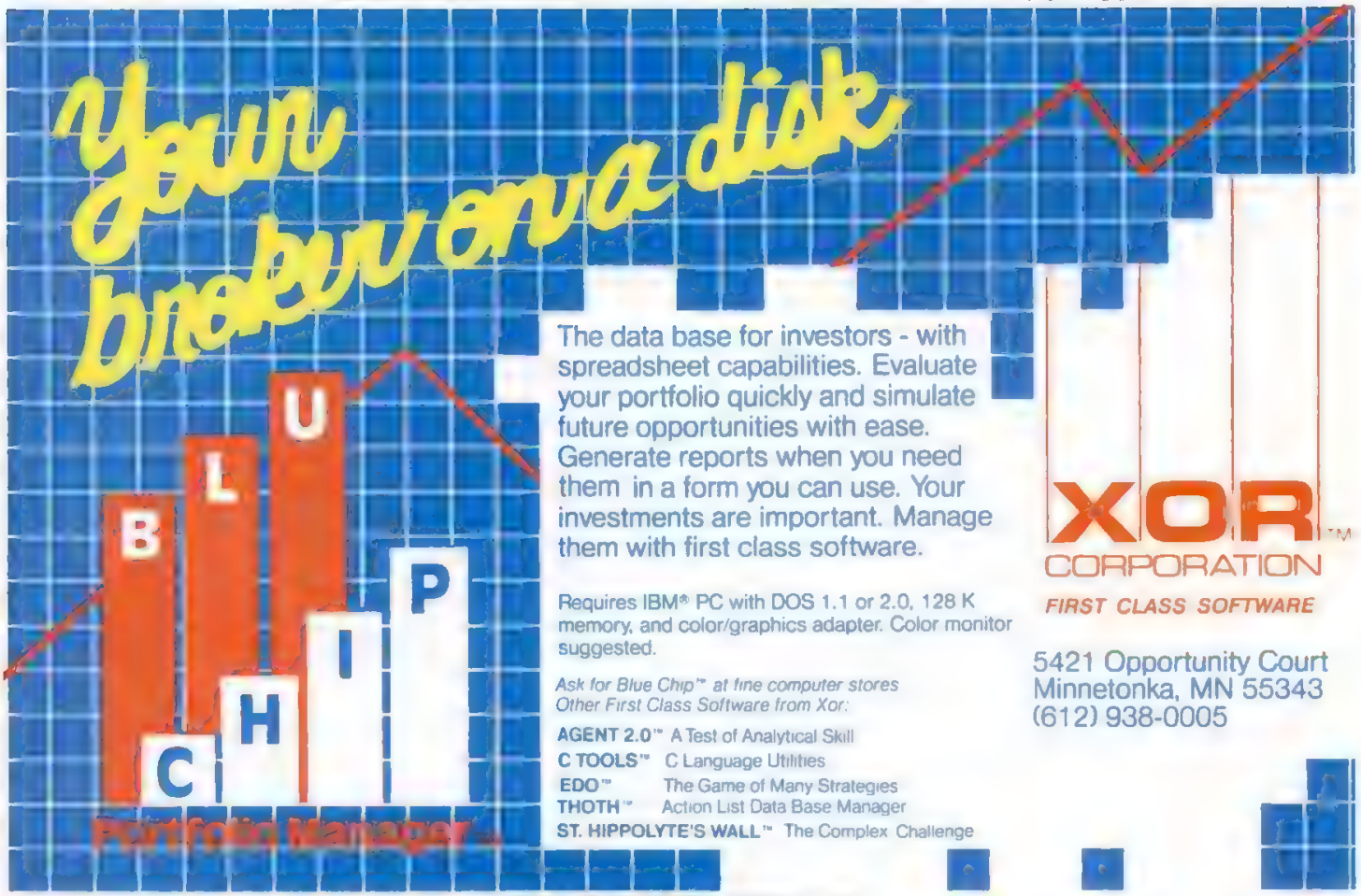
Initially, *VisiAnswer* will not allow data developed on a microcomputer to be sent back to the mainframe, but doing so would be more of a political problem than a technical challenge, according to Merritt M. Lutz, a group vice-president of Informatics General.

"Putting data back into a large, carefully controlled database is a chancy thing to do, and it is not all that acceptable to most data processing professionals," he said.

The Informatics philosophy, according to Lutz, is to strike a balance between the concerns of the professional who wants to work with valid data on his personal computer and the data processing manager concerned with the security, accuracy, and timeliness of the data that will be analyzed, and on which the company's decisions will be based.

"We believe," said Wilson Cooper, another Informatics vice-president, "that through *VisiAnswer* we will be able to provide the database professional with a great deal of security and provide the end-user with the capability to obtain data that he has a need for."

"Another thing that makes the *DB Answer/VisiAnswer* connection differ-



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ent," Wilson continued, "is that it is much more than file transfer. The database is extracted at the mainframe level, and a subset is created on the mainframe before it is delivered to the micro. The key issue is where the data is manipulated. I think this should be done at a level where computing power is greatest."

To deal with conflict between the corporate worker and the data processing manager, Informatics has developed the concept of the "personal information center."

"The personal computer revolution has swamped data processing departments. And, in a way, it has taken a lot of the sizzle away from the traditional information centers of a company," said Lutz. "PCs are getting so big and so sophisticated so fast that we believe that in many corporations the growth of these personal information centers will be much faster than the traditional information center. Any PC that can be a logical extension of the database makes an incredible contribution to corporate effectiveness if it is properly controlled. But the PC is not the key; software like *VisiAnswer* is really the key," Lutz continued.

Sending data back to the mainframe would be more of a political problem than a technical challenge.

Perhaps a unique aspect of the *VisiAnswer* concept is that it is not tied to any particular mainframe database. In fact, the information retrieval query process is expected to work equally well with in-house databases and time-sharing information services.

Projected sale price for *Answer DB* and *VisiAnswer* connected to 50 PCs and one mainframe will be about $45,000, according to Wilson.

Another company actively pursuing the mainframe connection is Lotus Development, whose only product is *1-2-3*, the first integrated database manager/spreadsheet developed for the IBM PC.

Lotus already has worked out agreements with McCormick & Dodge, Management Decision Systems (EXPRESS) and ADP Network Services, a time-share agency, to provide for the downloading of information from these mainframes into the PC for use with *1-2-3*. In addition, the company claims to be working on agreements with 15 other mainframe software and hardware vendors interested in opening up a microcomputer channel for their products.

"You will be able to call up data stored on a mainframe, download it into your personal computer, do some modeling

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with it, and ship the product back to the mainframe," is how Carl Gritzmaker, national accounts sales manager for Lotus, explained its mainframe connection.

In discussing the relative merits of the *1-2-3* connection with that of *VisiAnswer* or *VisiOn*, Gritzmaker indicated that the speed and power of *1-2-3* itself would be a determining factor. "We have definite advantages over Informatics' *VisiAnswer* package," he said.

The Fifth Wave

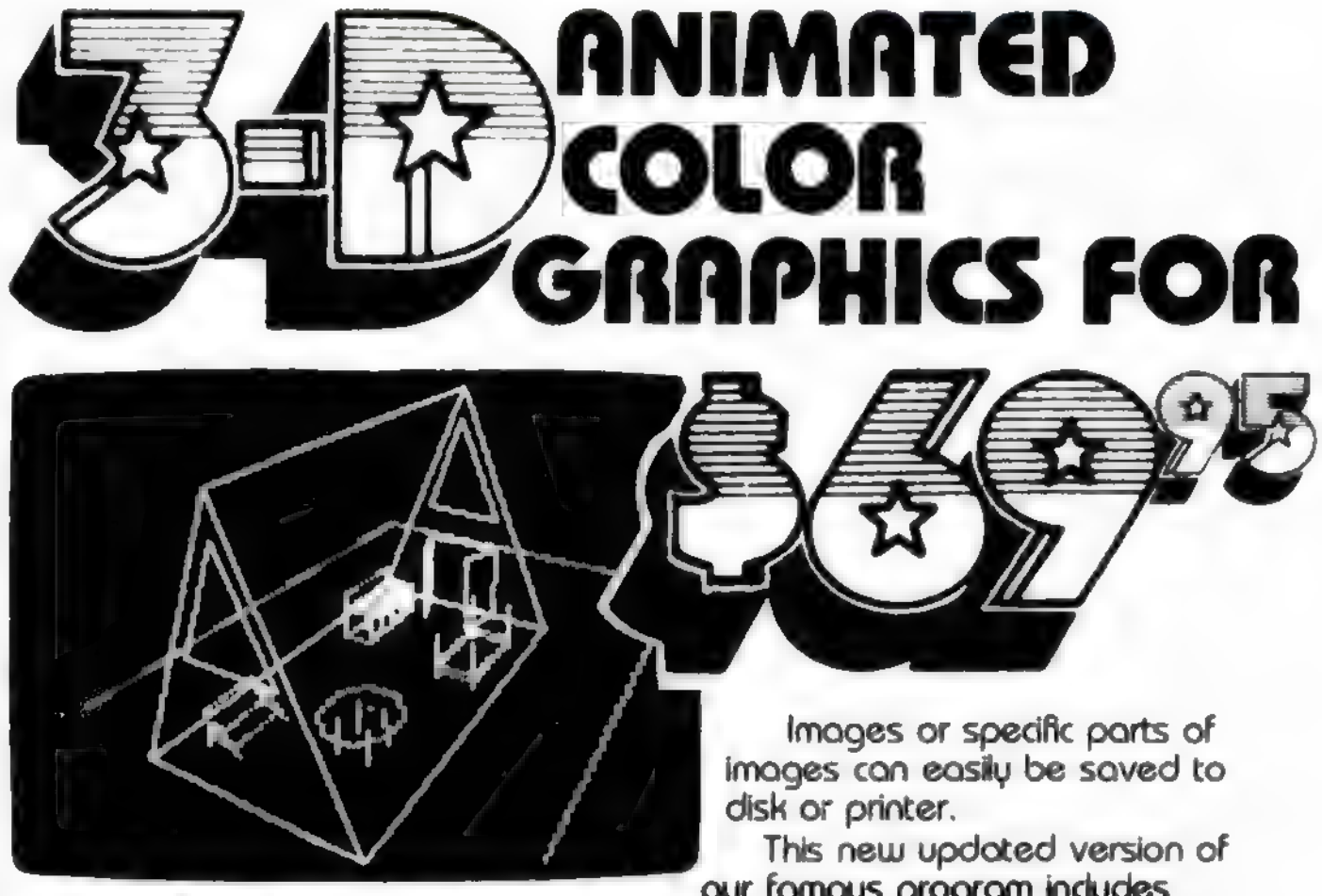
Though the mainframe connections will have an important impact upon businesses using PCs, the most significant impact may not be in the microcomputer world at all. Rather, it will be in the data processing centers of major corporations, which will have to come to terms with the inevitable decentralization of computing and data processing.

Resistance of data processing managers to allowing portions of data to leave the controlled, multiuser environment can be expected to crumble in the face of company professionals demanding "live data" for their PCs and other microcomputers. Companies that rush to join the mainframe to micro trend are likely to enjoy a competitive edge, because they can reduce the number of mainframe users during peak periods, as well as high timeshare hourly fees, while increasing their computing power.

DATA processing centers will have to come to terms with the inevitable decentralization of computing and data processing.

The spreading of computer expertise through industry will bring about the fifth wave of software for the IBM PC: programs specifically tailored to thousands of businesses and the millions of tasks they engage in each day. For instance, shoe store owners will have programs custom-designed for their business; magazine writers will have programs designed to facilitate the writing, editing, and proofreading of articles; students will have powerful software to help them access educational databases for their homework projects. These developments are not as futuristic as they sound; programs to perform these and even more complex tasks are currently being written.

These task-specific programs almost certainly will reach the marketplace in the next few years, provided a good mechanism for distribution is found. When this wave of personalized software does become available, the stage will be set for the complete computerization of society. */PC*



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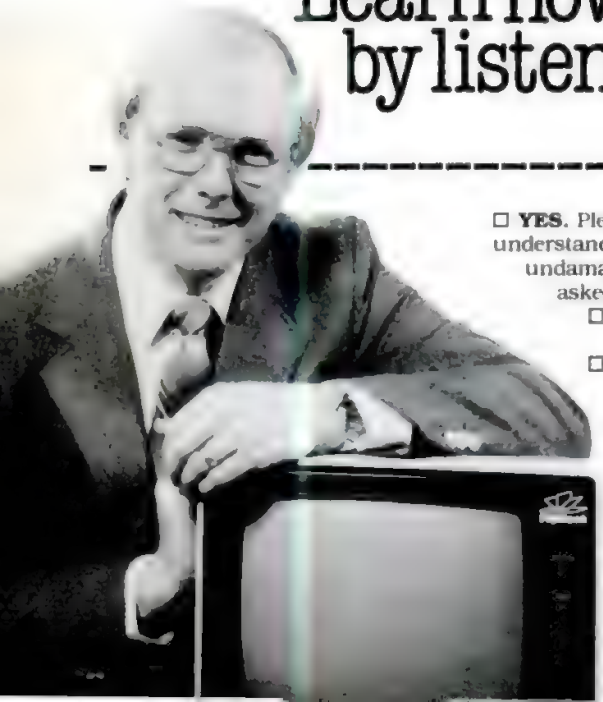
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Manufacturer	Model	Qty

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Manufacturer	Qty	Manufacturer	Qty

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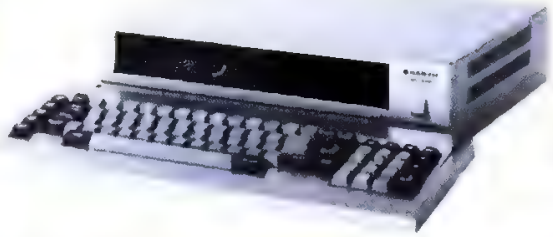
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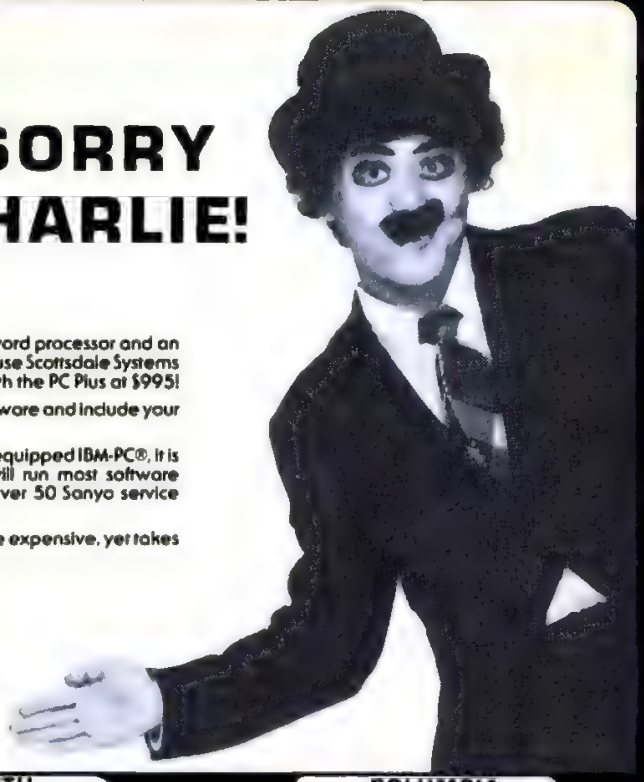
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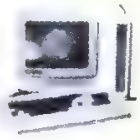
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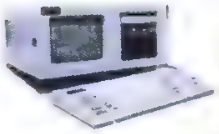
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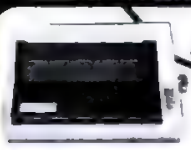
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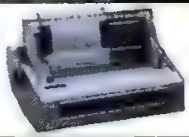
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See us at COMDEX Fall '83

CIRCLE 372 ON READER SERVICE CARD

With emulation software and hardware, the PC can pass for a DEC VT-100 or IBM 327Q terminal or any of a host of other devices.

Multiple Personalities: Emulation With The PC

Does your PC read and write EBCDIC? Does it act like a DEC VT-100, an IBM 3270, or 3780 terminal? Does it speak Bisync or X.25 with the correct accent? If not, it will be turned away at the frontier's of DEC and IBM, where powerful mini and mainframe computers reside, feasting on ambrosial databases, instantaneously communicating with one another and with microcomputers throughout the world.

Your PC possesses protean abilities. Not only can it communicate with an IBM-3270, it can also pass for a DEC VT-100, and HP 2621, or any of a host of other devices, which might include such hardware as a CRT, a telephone, a printer, a modem, a disk drive, or a computer. The ability to imitate other machines is called emulation. The PC's emulation capabilities enable it to perform tasks that would otherwise require expensive devices that often overlap in their capabilities.

Emulation can be achieved through software or hardware, which translates codes from the device being "imitated." The PC, therefore, is more powerful than any single device; when emulating something else, it can assume another machine's capabilities, while the emulated machine's capabilities remain fixed.

For instance, there are many large applications programs running on IBM Digital, DEC, Honeywell, and HP minis and mainframes, which assume that they are connected to the appropriate IBM, DEC, or HP device. Unless the correct device is provided or emulated, these programs won't run. So, by "imitating" an IBM, DEC, or HP device, the PC has access to thousands of software applications the computer would otherwise be unable to use. The device imitated by the PC might be a CRT terminal, a graphics terminal, a cluster controller, or a printer.

Many IBM mainframe operating systems assume IBM 3270 or 3780 terminals are attached to the mainframe. With emulation software IBM PCs can replace these terminals as Remote Job Entry stations, and the PC can share mainframe's worldwide communications capability.

What Can Be Emulated?

In the myriad of emulation products available for the PC, you'll see roughly three types of emulations: asynchronous, synchronous, and both.

- Asynchronous CRT emulations are usually software-only products and require that you have an synchronous serial port and a modem. Some of the terminals emulated by these products are DEC VT-52/100, IBM 3101, HP2621, Tektronix 4010, Lear-Siegler ADM 3A, and Data General D100. Terminals such as these are com-



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monly used with minicomputers and may be used with mainframes, given the proper software and hardware adaptations on the mainframe. Since they are software-only, these products are cheaper than the other types. Most will allow file transfer of text files but not of EXE or COM files.

• Synchronous emulations all rely on synchronous communications boards, which are usually supplied with emulation software. In many cases, the software is multifunction; i.e., several terminals can be emulated, both synchronous and asynchronous. Some products include on-board modems, and some include an on-board microprocessor dedicated solely to communications and emulations, which frees the PC's processor for other tasks. In most cases, the emulations will allow both text and EXE/COM file transfer between the PC and the host computer.

To use these emulators, you may need a synchronous modem in addition to the emulation product. These modems cost upwards of $1500 and may require a special telephone line for high speed (4800 to 9600 baud) communications. Devices emulated by these products include IBM 5251, 2780, 327x series and 378x series display terminals, 3276 cluster controllers, and 3287 printers.

Many synchronous emulation products also give the PC the ability to communicate in various synchronous and network protocols such as Bisync, HDLC, SDLC, SNA, and X.25.

Cost Economies

There is a simple explanation for the explosion of emulation products for the PC: saving money.

If the PC can replace one or several terminals, and still be used for spreadsheets and word processing, it is much cheaper than a terminal that can only be used as a terminal. It is cheaper still if the PC can be made to function like several different terminals.

Many large and small companies already have large numbers of PCs sitting on desks. To get the most from their investments and to save desk space, the PCs can perform double duty as terminals or other devices; emulation is preferable to investing in hardware that may be obsolete next year. The PC, which perfoms its emulations with software or minimal hardware, has far less built-in obsolescence than a typical CRT terminal. Figure 1 shows some cost comparisons. (Prices assume you already own a PC.) These are rough estimates, and most of the PC emulations leave out some features of the device being emulated. But the fact remains: If you're looking for the basic functionality of the device, emulating it on the PC is considerably cheaper than buying, leasing, or renting the device itself.

Most PCs communicate in a mode called "asynchronous." The asynchronous modems available today cannot send or receive more than roughly 120 to 130 characters per second (1200 baud), and probably are limited by design to about a 260 to 270 character-per-second (2400 baud) transfer rate. Synchronous communications, however, allow much higher data transfer rates—up to 1200 characters per second (9600 baud). Coming increases in long-distance phone rates will make this speed improvement even

Figure 1: Comparative costs for devices and PC emulation products for that device.

Additional cost for	PC plus emulation product	New device
DEC VT-100	$125	$2000
IBM 3276 Control Unit Display Station	$690	$5,750 or $189/mo (lease)
IBM 3780 Data Communications Terminal Basic Unit	$895 (does not include printer, card reader, card stacker, or card punch)	$22,760 or $1,181/mo (lease)

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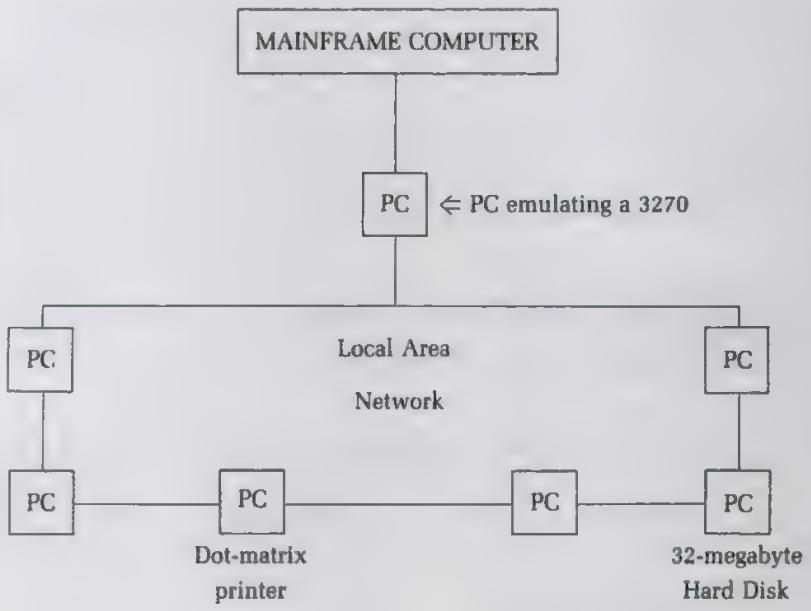
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more desirable than it is now. If a doubling of transmission speed means having the time connected, use of synchronous communications can pay for itself very quickly. On the other hand, if the amount of information going back and forth on the line is relatively independent of the connect time, as in most interactive programs, the baud rate has little effect on the length (and cost) of the call.

Both the asynchronous and synchronous emulation products give a single PC (or group of PCs and/or IBM terminals) the ability to communicate with and share files with a mini or mainframe. The network connection products have a different purpose: to enable multiple PCs and peripherals to communicate and share resources with one another. This does not mean that any one of the PCs in this network could not also be connected to a mainframe or a mini through a synchronous connection. It does mean that synchronous connection, or any other connection, is accessible to any PC in the network (see Figure 2).

In such an arrangement, any of the PCs in the network can use the 3270 emulation facilities installed on a single PC, as well as the hard disk and printer facilities that belong to the network. These resources can be distributed among all the PCs without duplicating the hardware investment in 3270 emulation, printer, or hard disk.

Figure 2: In a network the PCs have access to the mainframe computer through PC emulation.



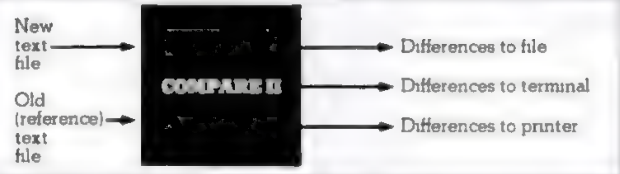
DISTRIBUTED processing networks are managers that divide work among all available resources.

Emulation can be employed in a "distributed processing network," where tasks are distributed among all the computers and peripherals attached to the network, offering much more than simple communications. Programs on one network computer can run and communicate with programs on any other network computer. Files or peripherals attached to any device in the network are potentially available to any other device. Distributed

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processing networks are "managers" that divide work among all available resources.

IBM has a long-range plan called Systems Network Architecture (SNA) to tie together all its computers, printers, card readers, and terminals into one large distributed network. DEC, Wang, and most of the other major manufacturers also employ methods to do this. There is even an international standard, CCITT Recommendation X.25 being used in Europe, which defines a series of protocol levels. Each of these network plans relies upon some lower-level building blocks for simple communication. Communication protocols such as lower-level building blocks for simple communication. Communication protocols such as Bisync, HDLC, and SDLC enable the mainframe to communicate with the PC through codes. These lower-level building blocks are available now on the PC and serve as the foundation for more sophisticated communications.

PROGRAMS on one network computer can run and communicate with programs on any other network computer.

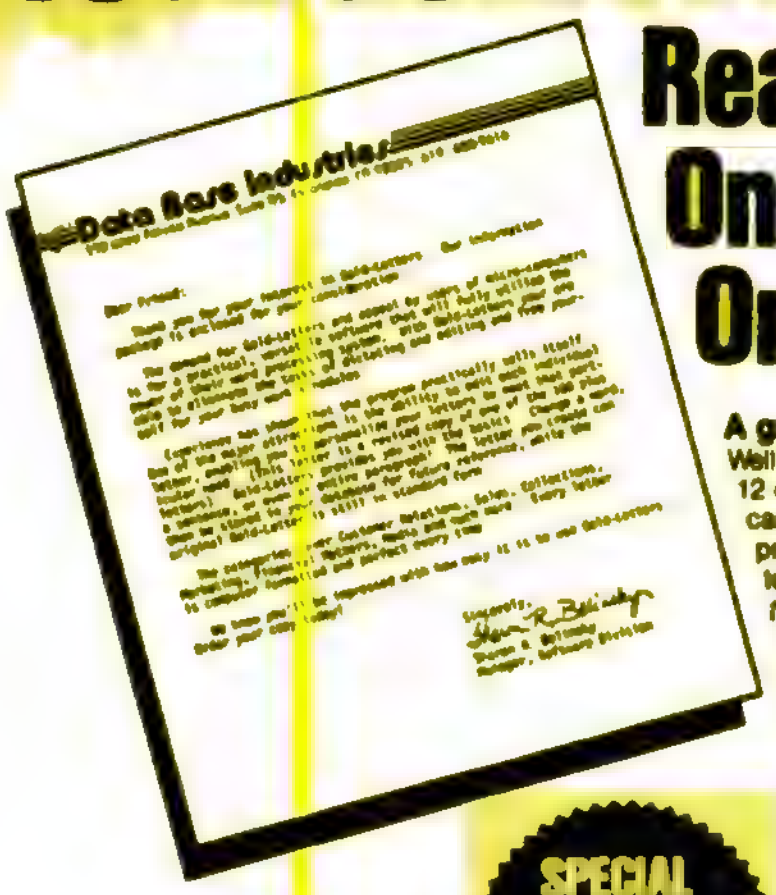
You may have no need to connect to a worldwide distributed network but still wish to connect the computers, laser printers, copy machines, and telephones in one building. Such systems are called Local Area Networks (LANs), because they do not attempt to haul large quantities of data over long distances. Their purpose—to share resources—is basically the same as that of the larger networks.

While your office may have only one letter-quality printer and one hard disk, any of the 30 PCs attached to the (LAN) can use those resources with no conflict, as if they were attached to that PC alone. Any of those 30 PCs might run a program on any of the other PCs, as if they were extensions of itself. LANs allow for a great increase in use of resources and a commonality of data, which doesn't exist when each PC has its own floppies with data stored in a particular way. LANs themselves do not require PC emulation products, but in order to use them most effectively, emulation is usually employed. Emulation allows the data from the outside world to be used in the network.

Currently there are many LANs available on the PC: Omninet, PCnet, to name a few. But the LAN with the greatest industry support appears to be Ethernet, backed by Intel, DEC, and Xerox. Ethernet interfaces are available for the PC from several vendors.

You may also avoid emulation entirely by placing different devices on the LAN,

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rather than using PC emulations, Apples, Radio Shacks, Corvus Concepts, and other micros may be linked on one Omninet LAN, for example.

There are several Ethernet LAN products now available, as well as other, less expensive LANs. One original approach is Technical Analysis Corporation's Irmaline, which uses phone-line sharing to implement networking. (For more on networking and detailed description of an Ethernet product, see "Let There Be Ethernet!" PC, Volume 1 Number 11.)

Where Should Work Be Done?

The first emulation products available for the PC were simple programs that emulated DEC VT-100s or IBM 3101s. The programs are simple because they translate characters with particular functions (e.g., clear the screen, erase a line) to the DEC VT-100 or IBM 3101 into the appropriate actions on the PC screen. When you wanted your PC to look like a VT-100, you just ran the program. Many of the asynchronous emulators still fall into this category of discrete software emulations. When run, they install themselves in memory and stay there, intercepting all characters to the screen and from the keyboard, until they are told to stop.

Later, emulations were included as part of other products. The Xedex Baby Blue CPU board added Televideo 950 emulation to CP/M-80 so that *WordStar*, which hadn't yet been made available under PC-DOS, would run on the PC under CP/M-80. *Crosstalk*, a commnications product, included emulations for the DEC VT-100, the Televideo 920, and other terminals.

Operating systems vendors took a different approach, saying that the proper place for emulations was in the operating system itself. Digital Research released CP/M-86 with IBM 3101 emulation included, IBM, on the other hand, provided for device drivers in PC-DOS 2.0, which can be used to make the PC emulate any device or group of devices. IBM even provided a sample device driver on the DOS 2.0 system disk, called ANSI.SYS, for an ANSI standard terminal (a VT-100).

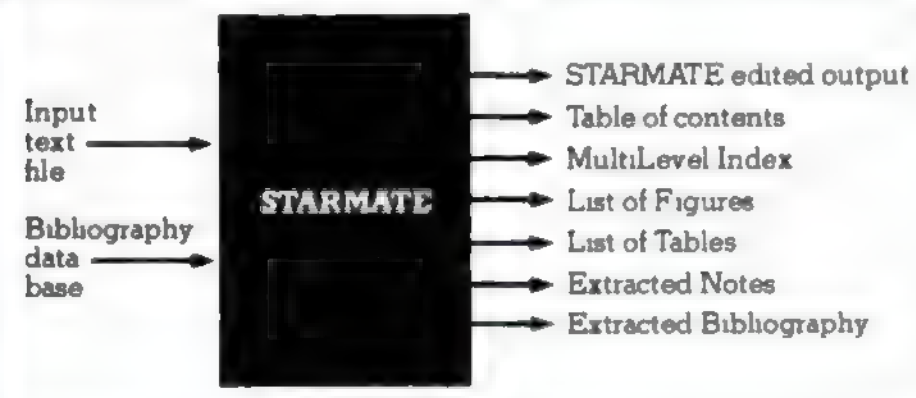
Of these three approaches to emulation—standalone emulation, emulation

NOT ONLY CAN the PC screen be made to emulate a terminal, but the PC memory can be made to emulate a disk, and the IBM printer can be made to emulate a different printer.

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as part of another program, or emulation built into the operating system—the last, for several reasons, is most attractive. First, it can be used with any other program and takes up very little memory (about 600 bytes for ANSI.SYS). Second, it is less likely to cause interference with other programs. Third, it is a very general method. Not only can the PC screen be made to emulate a terminal, but the PC memory can be made to emulate a disk, and the IBM printer can be made to emulate a different printer.

Considering the advantages of device drivers over other methods, it's hard to understand why there are none available. Perhaps the vendors of stand-alone emulators are now busily converting their products to device drivers. Or perhaps IBM will surprise us with a collection of 25 oldie-but-goodie device drivers.

Giving the PC More Power

When it comes to synchronous emulations, the PC needs more power to carry out the task in so little time. Not only must characters be translated into actions on the PC, but bits must be packed and unpacked, data must be checked, and EBCDIC must be converted to ASCII.

IF YOU NEED a bit more zip in your PC, consider one of the co-processor products.

These various tasks must be done quickly, since synchronous data is coming in at a rate of up to 9600 baud. Most manufacturers of synchronous emulation products use additional hardware to off-load some of this work from the PC. The Zilog SIO chip, which supports Bisync, HDLC, and SDLC protocols on-chip, is often used.

Several manufacturers have decided that PCs will be used so often in communications that a separate processor is desirable. Communications will become a "background task," something that goes on invisibly as you use the PC for word processing, or spreadsheet analysis. Microsoft shares this idea and has provided for communications as a "background task" in DOS 2.0.

To allow you full use of the PC processor while communications takes place, these manufacturers have dedicated another processor to handle communications. This processor (a Z-80, 6809, or 8088), has its own memory, its own routines in ROM, and its own serial port. It may also have its own modem on the same card. Whatever terminal emulation, communications, or protocol conversion must be done, is done by the communications processor, leaving the PC free for other tasks.

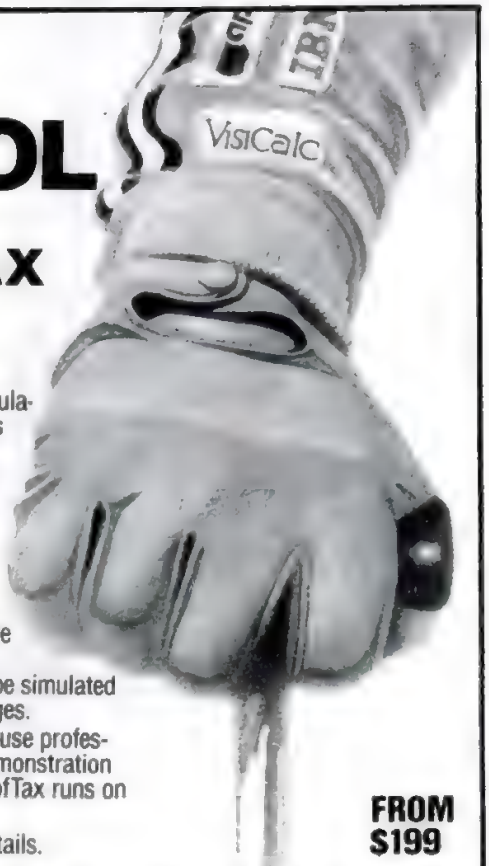
Co-processor products offer many advantages. Most of them allow both asynchronous and synchronous communications on the same card, as well as multiple terminal emulations. For example, Microlog's Babytalk includes an on-board 300 to 1200 baud modem, IBM 5251, 3270, 2780, 3780, and DEC VT-100 emulations, as well as an on-board serial port which can be used for printer despooling. If you need a wide variety of emulations, a bit more zip in your PC, or simply want to save those precious slots, consider one of the co-processor products.

Communications is not, however, the only use for co-processors. Operating systems or entire computers can be emulated on a co-processor card in your PC. The Microlog Baby Blue card uses a Z-80 co-processor to run CP/M-80 programs, and Quadram's. Quadlink recreates an Apple II inside the PC. There are even co-processors so new that there is very little software available for them yet—for example, Sritek's 16032 board for the IBM PC.

Why are so many vendors selling so many products to make the PC look like other terminals, run other operating systems, and imitate other computers? You guessed it—there are so many PCs out there, and their number is going to keep growing. A market like this is irresistible.

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Description: VT 100/102/52 emulation.

PC-Link
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VEDIT 1.36

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Quotes from InfoWorld review by Tim Daneliuk

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Description: Data General D100, D200, D400 terminal emulation with file transfer. Speed up to 9600 baud.

V/Term
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25 Waterside Plaza
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(212) 684-7788
Price: $125
Requires: PC-DOS, 64K RAM, monochrome.
Description: DEC VT 100 and VT 52 emulator.

VDTE 2
Inner Loop Software
P.O. Box 45857-A
Los Angeles, CA 90045
(213) 645-5162
Price: $200
Requires: PC-DOS, 64K RAM, monochrome, async card.
Description: HP 2624B, 2648A, DEC 52 emulation, designed for communication with HP 3000, block mode transfer with HP 3000, 110 to 19200 baud, HP 2648 vector plot subset. File transfer.

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Description: Host utility, upload and download of files for S/38.

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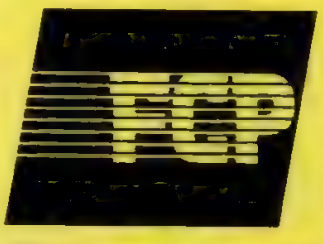
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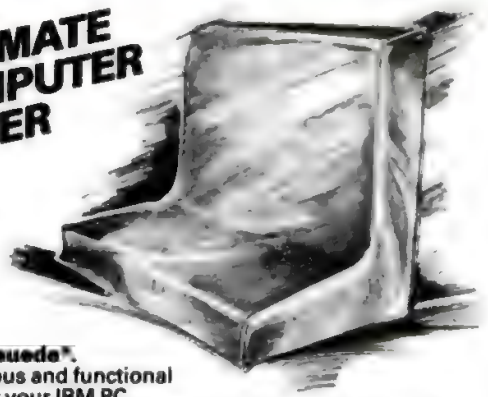
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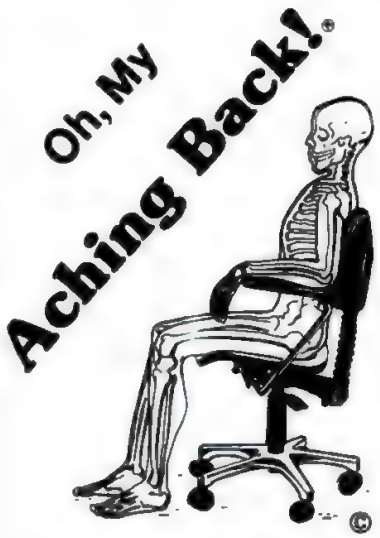
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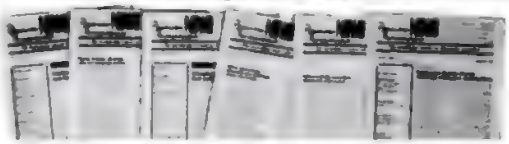
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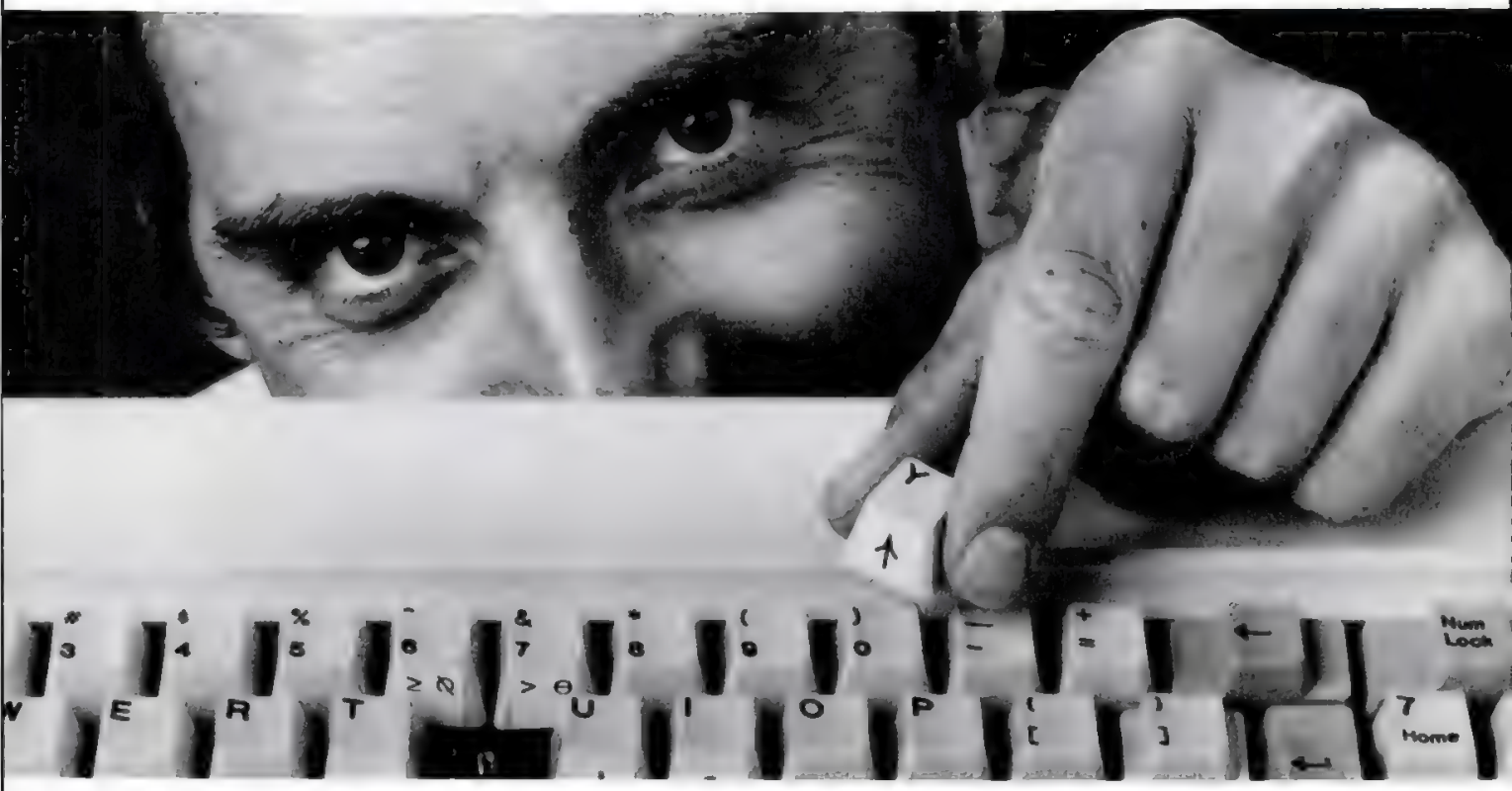
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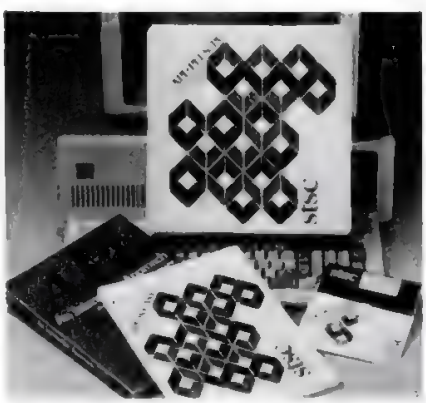
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One part is the "hardware," the machinery itself. The other is the "software," which tells a computer what to do, the way a driver tells a car what to do.

Without software, a computer can't do anything. And vice versa. You have to buy both.

Buy the software first.

Since the reason you're buying a computer is to get the capability the software gives you (remember it's the software that tells the computer what to do), it makes good sense to pick the software first.

Start by making a list of the things you want the computer to do. Possibilities include word processing, inventory control, accounting, graphics, recordkeeping—you name it, there's probably software that does it.

Next take your list into a computer store and ask the salesperson to demonstrate software that will do the things you want.

Even though you'll need a computer for the demonstration, keep in mind the computer is just a vehicle. The software is the driver. Once you've decided on software, picking the rest of the computer system will be that much easier.

The simpler the better.

Some people will tell you that software has to be complicated to be powerful. Nothing could be further from the truth.

Good personal software should be, as the computer people say, "friendly." Meaning that it helps you do what you want to do without getting in the way.

Good software keeps the complications in the computer, where they belong. And keeps the capability at your fingertips. It's that simple.

Simply see for yourself.

You can read any number of interesting books and magazines about personal computers. You can ask your friends who have them.



Or look at all the sales literature you can get your hands on.

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WRITE also works with most popular software programs, including the PFS Family of Software.

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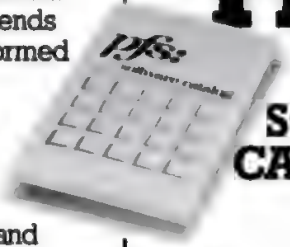
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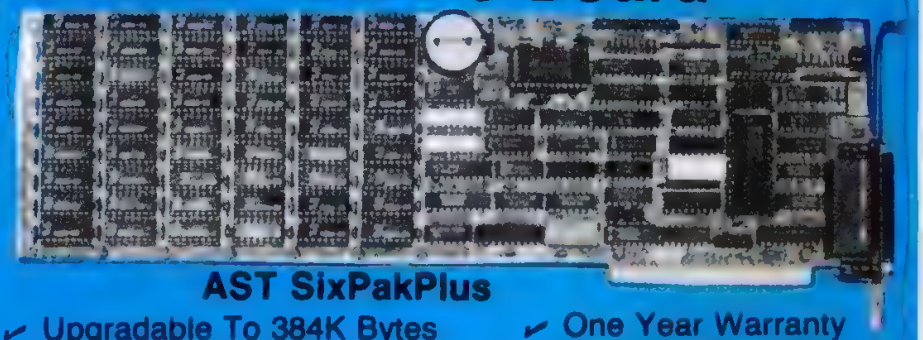
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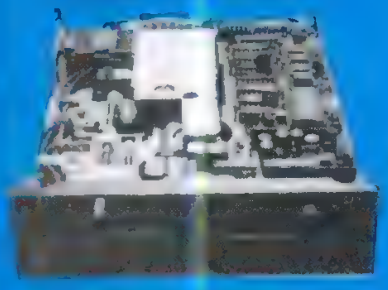
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Transferring data files from an Apple to PC format can produce many headaches. If you decide to attempt it, here are some suggestions that should help conserve your aspirin supply.

Surviving An Apple To PC Switchover

Your new PC seems to glow in the warm yellow light from your table lamp. You almost can hear "Use me, use me!" whispering from its tiny speaker. But before you can get too involved with your new helpmate, your new love, you have something very important to do.

You have to transfer all your *VisiCalc*, *WordStar*, and other business program files from Apple to PC format. After all, you have to break it off completely; no ménage à trois for you, hopping from computer to computer.

But had anyone told you that parting with your Apple for a PC would cause such sorrow, you might have thought twice before making the switch. You knew your Apple programs would be useless with the PC, but you felt confident that you could pass along data files with no trouble. "It's a cinch," a friend may have told you. More untrue words could not have been spoken.

The headaches, the confusion, the sleepless nights: All could have been avoided had you known how to play the Apple to PC data file switchover game. And if, by chance, you have yet to make the defection from Apple to PC, take warning from those who have tried: It's not as easy as you think. More computer-literate hackers than you have attempted it—and failed.

Is all this fuss about switching from an Apple to a PC for real? Look at it this way: Most computer users have a good deal of time and money invested in their data files. Having to rekey information into a new computer is a waste. The better alternative is to transfer information from Apple disks to PC disks electronically. This applies, of course, not only to those trading in their Apples for PCs, but also to those who have both computers at their disposal and find that they must occasionally trade data between them.

FILES created with a CP/M card are often a breeze to transfer.

Several software and hardware schemes are available to make transferring files from an Apple to a PC-format an easier and simpler task. Clearly, some are better than others. But which ones? In fact, are they really necessary at all? And what about co-processing—putting an Apple board into a PC?

How to Turn the Apple Blue

How is the typical file transferred from an Apple to a PC? The file—say, a *WordStar* text file, for example—which was created with an Apple using a CP/M card, is retrieved from disk by a standard telecommunications program that allows data capture and data transmission (rather than the more simple "terminal" program that simply allows you to converse with a remove computer). Connected to the Apple is a phone modem, which is plugged into a regular telephone line. Everything is set on the Apple to allow the *WordStar* file to be transmitted through the modem—all in all, a relatively easy job.

Hooked up to a second phone line is yet another modem. The wires from this one are connected to an IBM PC, which is also using a telecommunications program. This PC is configured to receive data—via the phone modem—from the Apple, and capture it permanently onto disk. A press of a button on both machines begins the operation, which is handled automatically by the software loaded into the machines.

Sounds easy, doesn't it? On closer examination, it becomes clear that the picture isn't so rosy. The rub is that dozens of potential problems lurk in the shadows, ready to pounce on the unsuspecting. First and foremost are the two types of files that both the Apple and the PC can create. One of them lends itself easily to transfer; the other one does not.

The most common type is the ASCII or text file, so named because it uses what's known as ASCII (American Standard Code for Information Interchange) to generate a set of standard alphanumeric characters. Both the Apple and IBM use this code, so in theory, they are compatible.

ASCII is often found in word processing files, although it can also pop up in the dictionaries that compose spelling checkers and the records contained in data management programs. ASCII is the easiest type of file to exchange when going from one computer to another.

Binary, the other major file type, is less easily transferred, and often requires a more specialized communications program—one that's specifically engineered to handle binary data files. Binary files are typically found in spreadsheet programs, such as *SuperCalc* and *VisiCalc*. They are closely akin to ASCII files, but contain several extra, special purpose characters. The program must be able to process these characters or an unsatisfactory transfer will be the result.

IF YOU have yet to make the defection from Apple to PC, take warning from those who have tried: It's not as easy as you think.

In reality, the Apple and the PC have very little in common. Consequently, using Apple-created data on an IBM PC is difficult. The operating systems of the two machines format files differently enough that simply transferring the information is virtually useless. That is, unless certain precautions are met. The main problem is that Apple DOS creates files that lack a specific element that MS DOS requires. In addition, some programs used on the Apple create elements that MS DOS cannot tolerate.

More specifically, Apple DOS creates ASCII files where the end of each line is terminated by a carriage return (<CR>). When printing the file out, Apple DOS adds the required line feed (<LF>) to make the printer advance one line at a time.

MS DOS, like CP/M, requires a separate line feed after each carriage return in the file, and does not add one when printing. A file created on an Apple will need line feeds added to it if it is to be used on a PC. Many communication programs have a provision to "add line feeds to carriage return," but some do not. You'll obviously need one that does.

By the way, this is not a problem when using CP/M programs in the Apple (with the use of a CP/M card, of course). An Apple-CP/M file-to-PC file transfer circumvents such hassles (except with some file transfer programs; see sidebar for more details). In fact, files created with a CP/M card are often a breeze to transfer, because CP/M and MS DOS are so alike in their file structure. And if you've been using an 8088 co-processing board in your Apple, you're really in for smooth sailing.

The other problem is even more critical: MS DOS uses certain control characters to perform specialized functions. For instance, one is Ctrl-Z, which is used to denote the end of a file.

Programmers, unaware that Apple program files might someday wind up on a PC, have ignorantly written software that uses many of the special control characters used by MS DOS. It's highly likely that some Apple programs you own use control characters for certain embedded commands, such as underlining and boldfacing. When the PC receives one of the control characters—say a control-Z—it will assume everyone is finished, close the file, and terminate the transfer!

The solution: Take out all the embedded commands and hope the program

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isn't so poorly written that control characters still exist. An alternative is to make sure your telecommunications program—either on the transmitting or receiving end—can block the control characters. Blocking control characters has both its advantages and disadvantages. Standard ASCII characters, including several of the ones used by the computer, such as carriage return and line feed, take seven data bits to create.

Most special control characters, on the other hand, take eight bits. When transferring, all that's necessary is to turn the eighth bit "off." This is often done for you by the communications program. In other cases, you must specifically tell the program to send seven bit data or alternatively edit the eighth bit out of the file to be transmitted.

A FILE created on an Apple will need line feeds added to it if it is to be used on a PC.

In some cases, however, blocking the eighth bit can create big troubles. Perhaps the best example is when transferring *WordStar* files. Blocking the control characters eliminates all the "soft" carriage returns, those special end-of-line identifiers used by the program that permit easy reformatting of the text. The soft carriage returns become "hard," just as if each line were terminated by pressing the Return key. Change a word or two in the text and you won't be able to reformat the paragraph. Your only recourse is to delete the invisible (to you) hard carriage returns physically at the end of each line so that *WordStar* can re-create soft returns.

In these cases, when going from the Apple to the PC with identical programs like *WordStar*, it's wise to make sure data looping does not occur. Otherwise, with a word processing program especially, you'll end up with text and data that are difficult to manage. The best way to ensure compatibility is to find communications programs for both the Apple and the PC that permit binary file

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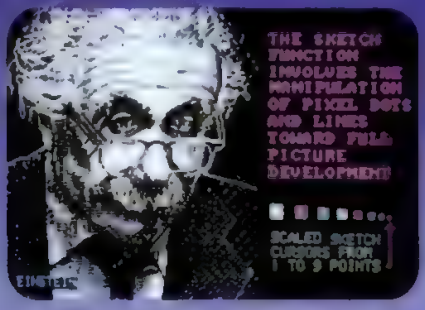
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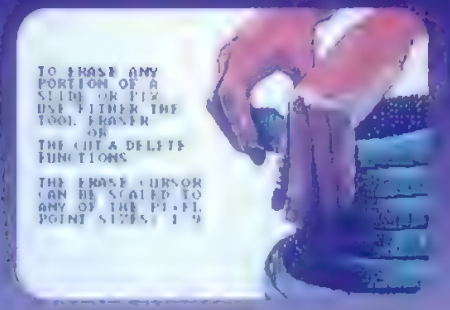
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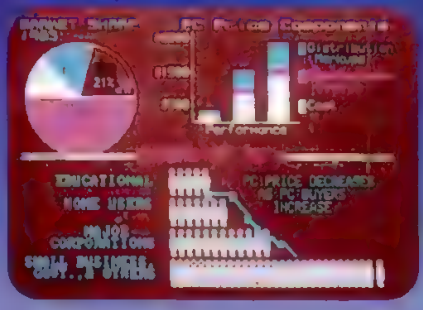
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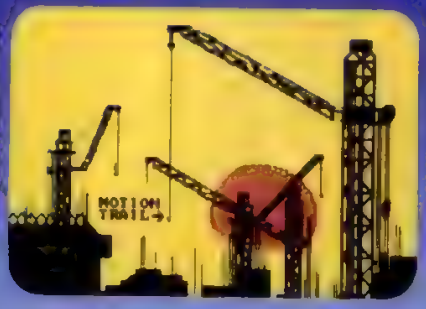
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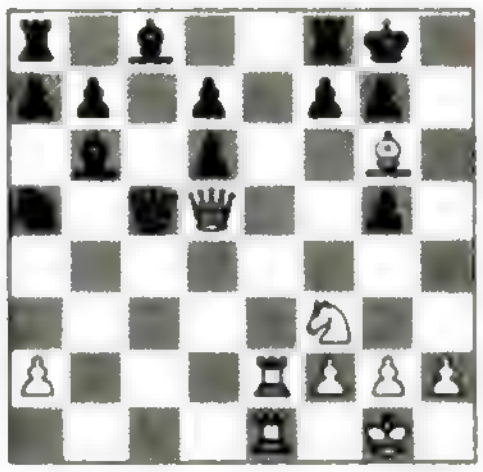
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transfer. With such a program, you're nearly assured of being able to transmit and receive eight bit data.

THE BEST way to ensure compatibility is to find communications programs for both the Apple and the PC that permit binary file transfer.

Call in the Middleman

Now, for some really bad news. Even though you may elect to use the same brand of program with your PC that you used with the Apple, data files created by the old Apple program may not work with the new PC program, even if you can transfer them intact. If you have been using BPI's accounting software for the Apple, for example, the old data files cannot be used with the PC programs. The Apple and PC software format data differently. Result: gross incompatability.

Peachtree's accounting software is slightly better engineered, but with an important exception. Its Series 40 Apple programs work only with its Series 40 IBM PC programs. IBM's accounting programs, many of which are also made by Peachtree, will not work with Peachtree Apple software.

Other programs, like IUS' *Easywriter* word processor, require the use of a conversion program before transfer can begin. To go from one of the Apple *Easywriter* programs (Original or Professional) to *Easywriter II* for the PC, a special purpose program must be used to convert *Easywriter* files to Apple DOS. The conversion program costs extra (of course), but if you are an *Easywriter* user, your Apple data can't leave home without it.

Some other programs that you might expect to allow easy data transfer may, in fact, prohibit it. One case in point: Programs written under the UCSD p-System. The beauty of the p-System is that programs and files are supposedly interchangeable between computers. And some business programs written under the p-System do indeed allow fast and efficient file transfer. But Software Publishing's PFS series (*PFS:Write*, *PFS:Graph*, etc.) cannot accommodate data transfer from Apple to PC. The company has hinted that a conversion program will become available sometime in the near future, but it has yet to make an official announcement.

But take heart: *WordStar* and many other business programs are not so limited; compatability between like programs for the Apple and PC is a surer bet with most of the very popular software packages. For example, *VisiCalc* and *SuperCalc* files created on an Apple (or any other computer, for that matter) can be moved to the PC with ease—provided that is, that the communications software can support binary file transfers.

Several programs permit cross transferring to a variety of other programs despite differences in the way the data is formatted. These programs output data in so-called "DIF," or data interchange format. DIF was originated by VisiCorp and is used in their Visi program series, such as *VisiCalc* and *VisiPlot*. Many programs, like *dBase II*, *1-2-3*, *Chartman*, and a slew of others transmit and receive DIF files as well.

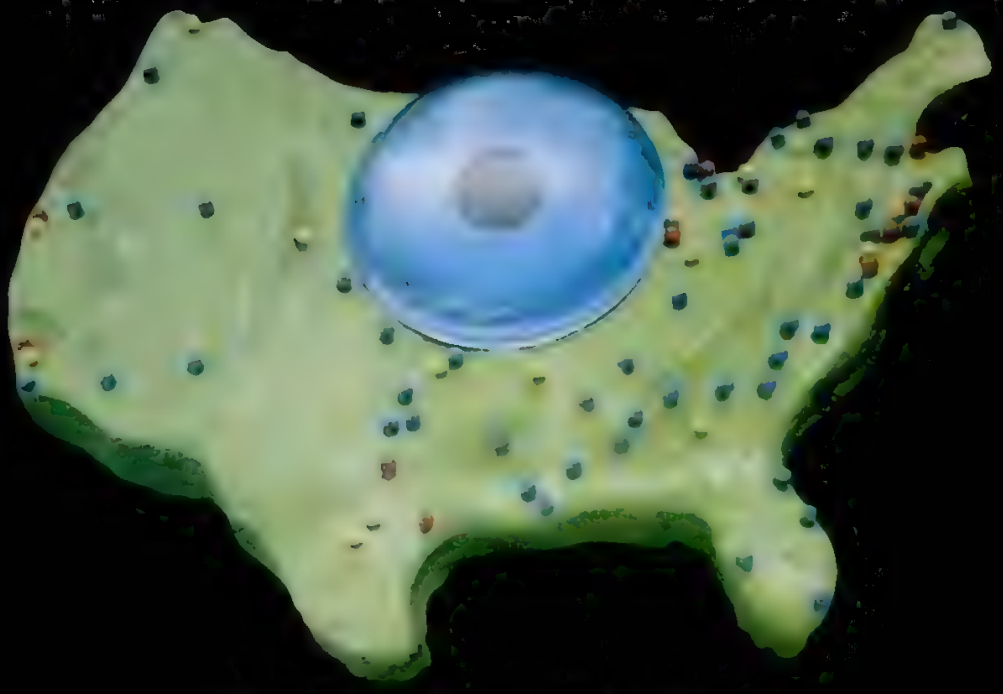
For example, data created in *VisiCalc* can be easily transferred to *1-2-3*, even though these programs use totally different data formats. Certain commands used in *VisiCalc* aren't used by *1-2-3*, and so some editing is required by you after the transfer. But changing and adjusting a bit here and there is much easier than rekeying a complex and lengthy file.

If you are having trouble transferring a file, check with your dealer to see if he knows of any reason why it won't work. Occasionally, a file conversion program or other trick will be available to make the job easier. In some cases, it may be necessary for either you or the dealer to contact the software manufacturer for technical help.

Hardware, Software, Nowhere?

The proper telecommunications software, as we've already seen, is paramount to a successful Apple to PC data file transfer. Not only must it be able to transfer both ASCII and binary data, but it must

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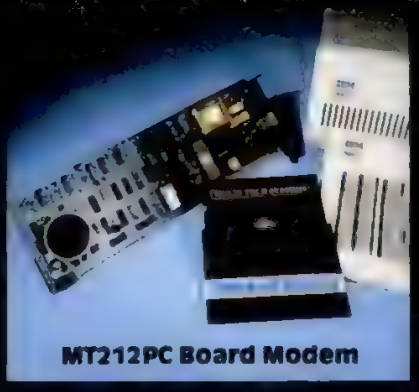


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also be flexible enough to allow you to add line feed characters and to subtract extraneous control characters at will. It must be more than a simple terminal program, providing both computer-to-computer communication as well as the ability to transmit and receive large data files.

If you already have communications programs for both the Apple and PC, take a close look at the fine print in their manuals. Make sure they fit the description given above. If they don't, you'll need to buy or borrow new ones that do.

On the hardware front, telephone modems are typically used as the interconnection between the Apple and PC. Because modems and phone lines are used, data exchanges are limited to the standard 0 to 300 and 1200-bit-per-second transfer rates. For long files, such as a 30-page report, this slow data rate can mean transfers of 30 minutes to an hour in length. But once started, the process is automatic. Fortunately, when modems are used, the only technical restrictions are that both units are operating at the same speed and that the communications software has been set up to match the speed of the modems.

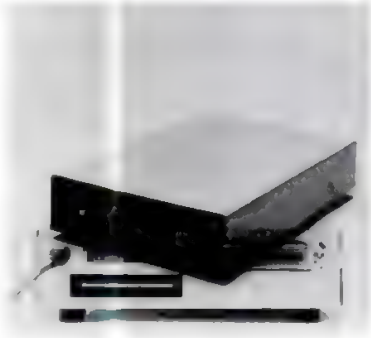
An alternative to using modems for data transfer is the "null modem," a simple multi-wire cable that is connected between an RS-232C serial port on the Apple to an RS-232C serial port on the PC. In essence, a null modem cable is comprised of three wires: a common ground connected to pin 7 on both ports, and two wires for receive and transmit. They are connected in such a way so that pins 2 and 3 of the ports are crossed. Pin 2 of the first port goes to pin 3 of the second, and pin 2 of the second goes to pin 3 of the first. In this way, data can flow easily between the two ports.

THE PROPER telecommunications software is paramount to a successful Apple to PC data file transfer.

Unfortunately, life is never this easy. Quite often, several of the remaining pins on the port must also be connected—sometimes to the opposite port and sometimes to itself. Each computer serial port requires something different, and it takes reference to the manual to see which pins must be held "high" (receive voltage) or connected to the other port for proper data exchange. Perhaps the easiest way, if you are not technically confident, is to take both computers to a dealer who can diagnose the needs of the two machines.

Null modem cables obviate the need for modems and phone lines. The best part about this method is that if the communications software on both sides of the transfer can accomodate it, data exchanges of 9600 bits per second and faster are possible. That means that lengthy files can be transferred in seconds, not minutes or hours.

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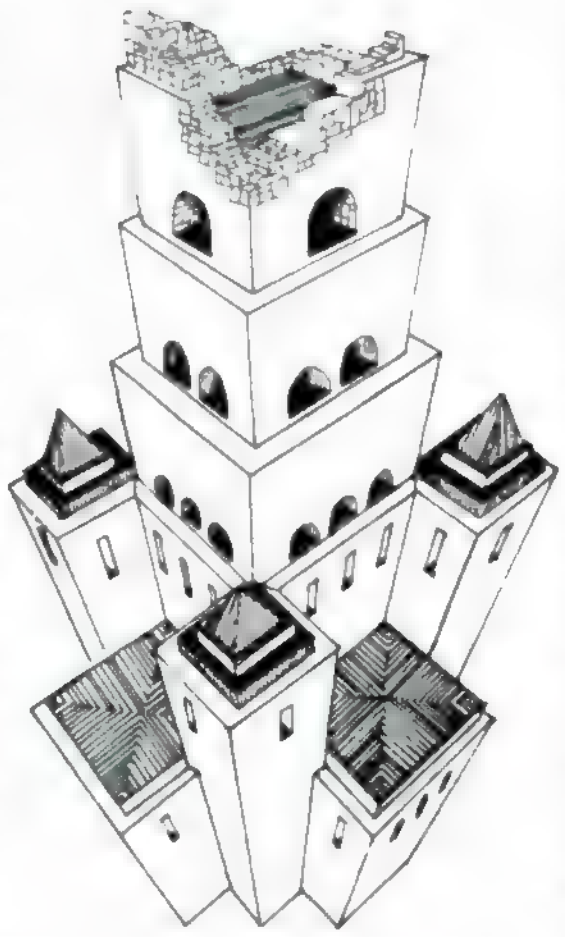
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Another alternative is to "print" the data out, and avoid complex modems, null modem cables, and phone lines altogether. This method is particularly suitable for transferring word processing files where embedded commands and soft carriage returns aren't required.

To print data into the PC, simply set the Apple and software—equipped with an RS-232C port—into print mode. Instead of attaching a printer to the other end of the serial cable, attach the PC's RS-232C port (a cable with lines 2 and 3 crossed, as described above, is again required; the additional support lines are typically not).

Drop a communications program into the PC, set it so that it accepts data at the same rate that the Apple is sending it out, and begin "printing." Apple's problem of absent line feeds is avoided here since the line feeds are added for printout.

An alternative to all this is using a co-processor board inside your PC—one that provides all the electronic guts necessary to run Apple programs. So far, only one company has a board that provides such co-processing power: Quadram's Quadlink. At $680, you'll want to make this purchasing decision carefully. You'll also want to test your software and data files thoroughly on a Quadlink board before you buy it and take it home. The board may not be able to read all of your diskettes—particularly the copy-protected ones.

If you don't have all the software and hardware required to do Apple to PC data transfers, and don't want to spend more buying extra gear, try tapping the resources of friends or business associates. Since transferring is often a one-shot deal—do it once and it's over—short-term borrowing shouldn't pose too much of a problem. Failing this, contact your dealer for help, but don't expect him to do it for free (unless he promised you he would when you bought the PC from him in the first place). Expect a charge of no more than $25 an hour, a price you'll find that's well worth it.

Finally, when it's all over, when you've transferred all of your files, go ahead and sit back, relax, and enjoy your new-found digital helpmate. One of the hardest computing jobs you'll ever likely do is behind you now—unless, that is, you decide to change computers again or add new ones to the mix. */PC*

Transferring Files: One User's Account

An IBM PC user describes how he survived the switchover from an Apple II.

When I recently purchased an IBM PC, I faced an increasingly common problem: how to transfer files from the Apple II I had owned for a year and a half to my new micro. According to most of the magazines, dealers, and my computer friends, the best, easiest Apple/IBM file transfer program available was Alpha Software's *Apple-IBM Connection*, a $200 package that includes diskettes for both computers, and full documentation "so simple that even a 5-year old child could run it." I had to dig down a little deeper in my wallet to spring for a $300 modem for the IBM, which I decided I would need anyway for calling up bulletin boards and other services. Fortunately, I already had a modem for the Apple, which made the whole operation a little less painful to my pocketbook.

I perused the manual carefully. The manufacturer had thrown in an audiocassette for additional instructions. I sniffed loftily at the cassette and opted for reading the documentation instead. It looked simple enough—at least, until I ran across a mention of Apple CP/M. It seemed that the Apple-IBM Connection couldn't transfer Apple CP/M files directly; they first had to be transferred to standard Apple DOS ASCII textfiles, using the "CPM to DOS" utility provided on the Apple diskette. (Apple BASIC and binary files also must be similarly converted before transferring.)

No problem, I thought. I grabbed a backup file of a recent story I had written, dropped it into the slot, and ran the program. The drives whirred and stopped. And whirred and stopped. While this went on, I waited. And waited. Just as I was about to doze off, the prompt popped back on the screen. It was done. Sure, it took awhile—about 10 minutes for a 10-page file—but at least that part of the operation was completed.

Now, to transfer it over to the IBM. I ran a 20-foot modular telephone cable from my Apple modem to my IBM modem and fired up the PC, with the IBM program installed. After a brief wait, the PC suddenly started beeping angrily, flashing the message, "A FATAL ERROR HAS BEEN DISCOVERED." I cringed. "What could I have done wrong?" I asked. The computer didn't reply, so I reread the instructions, checked the cable, and made sure the modems were working properly. Still no luck. I tried calling my dealer, who told me, "Duh, gee, well, we've never actually sold one of these before, and I don't have time to open one up and actually try it." I thanked him for his exemplary assistance and tried calling the manufacturer's hotline, which was constantly busy (I assumed I wasn't the only one having trouble with this program). As a last resort, I called an independent computer consultant friend of mine who talked me through the set up.

YOU HAVE to keep a close eye on both the Apple and IBM monitors, since neither computer gives you an audible signal when the transfer is completed.

My end of the conversation went like this: "Nope, I tried that already." "Yep, checked that, too." "Of course I tried different cables!" "Yes, I'm using the right sync port." "Whaddya mean, go see if the modems are plugged in?" "What do you take me for, an idiot?" "Oh, thanks a lot!" Eventually, we tracked down the problem, which was two-fold. First, although the program can run with a Mountain Hardware CPS Apple Card in slot #2 or #3, it only works with a regular modem in slot #3. My Apple was equipped with a standard D.C. Hayes MicroModem, but since my 80-column card was already in slot #3, I had to do some board-swapping to get this to work. That, said my friend, would do the trick.

Wrong. Again, the nasty "beep-beep-beep" snarled from the IBM's internal speaker, with the flashing "FATAL ERROR" message appearing on the screen, again reminding me of my own incompetence. Again, my friend the technician came through. It seemed that for normal modem communication, you needed to set the DIP switches of the IBM SmartModem to "1, 3, 6 and 7 on," which is pretty much the way it came out of the box. For the Apple-IBM Connection, however, only Switch 7 is left on. This sneaky fact was omitted from the manual's 106 pages—or, at least, if it was there, I couldn't find it after reading it from cover to cover half-a-dozen times.

Feeling somewhat like a mad scientist, I pushed the appropriate buttons on both computers at the same time and held my breath. I began to turn blue. Once more I waited. And waited. No error message. No "beep-beep-beep." Just silence. Just as I was beginning to give up hope, the screens cleared and a cheerful "LINK ESTABLISHED" message appeared. My heart skipped a beat as I tossed in the appropriate text file disks in the appropriate slots and pounded the filenames in on the two keyboards.

Again, I hit the right buttons and

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prayed. Once more, after a brief wait, the screens vanished and showed me the modes of the two machines ("SEND" for the Apple and "RECEIVE" for the IBM), with a strange "____ Sterzag Units Transferred" message, which referred to the amount of data flowing through the cable from one computer to the other. Once more, I nearly nodded off to sleep, as the entire transfer program took well over 10 minutes. I noted that throughout all these procedures, you have to keep a close eye on both the Apple and IBM monitors, since neither computer gives you an audible signal when the transfer is completed—a big disadvantage, in my book.

Once transferred, I checked the file on the IBM. It seemed great, except that on the right column, where I normally see a neat vertical row of spaces, dots or "less than" symbols (<), there was nothing but dashes. Despite the fact that it was already 3 A.M. I rubbed my weary eyes, shook my head, and decided that this must be the "eighth bit" problem my friend had warned me about. Sure enough, when I attempted to edit the file, *WordStar* treated it as if it were a single line, 5000 characters across, instead of being a 600-line, 10-page article. Needless to say, editing a file like this is unruly, at best, so I again plowed through the *Apple-IBM Connection* manual to find a solution.

Once more, I had to use a utility program—"Reform"—to add line feeds to the

IT TOOK nearly 45 minutes to convert, transfer, and reconvert a simple 10-page article.

document. This seemed like no big deal, so I loaded BASIC and ran the program. And waited ... and waited ... and waited, until I was sorely tempted to bludgeon the IBM. Meanwhile, the Apple II snickered on a table across the room as I silently glared back in response.

All told, it took nearly 45 minutes to convert, transfer, and reconvert a simple 10-page article. And that's not all: I dis-

covered that sometimes, either the IBM or the Apple (usually the latter) hangs up and begins spitting out data erratically, without warning. I learned to check files constantly, to make sure they were being transferred correctly; once I found an old article that got stuck in the middle and endlessly repeated the letter P for the rest of the document, as if it were written by a stuttering P-P-Porky P-Pig. Another time, I opened a transferred file on the IBM to check it and discovered a screenful of garbage, looking all the world like a digital representation of alphabet soup. Even though you can't edit them, I found it's a good idea to check the files as early as possible, to avoid wasting precious time trying to convert and reform a bombed textfile.

One particularly irksome problem that comes up all the time is the tendency of the transfer program to drop off spaces between sentences, placing one space instead of the usual two between them. Sometimes, the spaces are on the screen but won't print properly; other times, they aren't on the screen, either. I also discovered an unusual quirk of the Apple CPM-to-DOS conversion utility, which seemed unable to convert any files with lines longer than 80 characters. For these, I really had no choice but to print them out on the Apple and retype them by hand on the IBM. As a matter of fact, my writing partner (who had been chuckling and clucking his tongue throughout this entire escapade) laughingly advised that it would probably go faster if I just re-keystroked everything. Except for the longest files, it probably would be faster, depending on your typing skills. But I was determined to get my money's worth out of the program, even if it killed me.

So far, it hasn't. But even at this late date, a month after buying the *Apple-IBM Connection*, all my files aren't yet transferred. The bulk of the important articles is done, but there are plenty of minor correspondence disks and miscellaneous files yet to do. Since I spend most of my waking hours writing, there isn't a lot of time left to sit around and transfer files. I did learn a couple of tricks to help make the conversion and transfer process go a little faster. First, get two monitors to help you keep an eye on both computers while they're running.

Since I had only one green screen, I was forced to use an ordinary tv set with the Apple, which wasn't quite adequate for checking 80-column CP/M files, but it was enough to get me through the transfer program itself. Also, I kept careful records of which files I was transferring, making sure I kept the same names whenever possible, except when the filenames weren't allowed by PC-DOS. When using the "Reform" program, I used my electronic RAM disk to help speed up the BASIC program, to minimize any reading/writing delays. Last, I used an alarm clock to buzz me at 10-15 minute intervals, to remind me to check each computer to see how the "Sterzag Units" were coming along, and to see when the transfer was finished.

I COULD'VE easily grown a beard while waiting for the files to transfer.

Since You Asked . . .

What improvements would I make on the *Apple-IBM Connection*? Well, for one, anybody considering using it would be a lot better off making the file transfers at 1200 baud instead of 300. I tell you, I could've easily grown a beard while waiting for the files to transfer, with the data trickling through like grains of sand through an hourglass. Unfortunately, my modems could only handle the slower speed; more's the pity. Next, I think Alpha Software would do well to program in an audible cue whenever the file conversion or file transfer is completed, if only to avoid forcing users to keep their bloodshot eyes glued to the screen throughout the process. Also, I don't see why an Apple CP/M file transfer program couldn't have been included, to avoid the DOS conversion process entirely. And, perhaps most important, there's got to be a better way of adding line feeds to ASCII files than using an ultra-slow BASIC program. Surely, such a program could be converted to machine language to run a lot faster, and avoid the delays that come up.

Considering the "user-friendly" nature of the documentation, it's a wonder that the manufacturer didn't provide the ability to get out of the programs more gracefully. Except for the BASIC "Reform" program, I couldn't find a way to return to PC-DOS without resetting the computer and booting up from scratch. Obviously, this could be a serious hassle if you plan to use the program with a RAM disk. I later found out that an updated instruction card slipped into the manual informed the user that depressing the F1 and X keys allows exiting into DOS without any problem; unfortunately, this card appeared to have been waylaid between the time I purchased the program and brought it home. This sure points to the need for binding any last minute manual updates into the documentation itself, preferably on page 1, marked "BE SURE TO READ THIS BEFORE YOU MAKE A TOTAL JERK OUT OF YOURSELF."

All things considered, had I known the significant drawbacks of this program before I bought it, I might well have opted to use a standard CP/M data capture program instead. On the other hand, when puttering around with computers at 3 a.m., I like as many menus and user-friendly attributes as I can get, to avoid the inevitable mistakes that come up through sheer exhaustion. As long as you're extremely patient, or don't have to transfer the equivalent of a couple of novels, *The Apple-IBM Connection* does its job adequately, albeit much more slowly (at 300 baud) than I would like. And the good thing is, once they're transferred, they're done; you never have to worry about it again—at least, not until you buy a new computer. As for me, I think I may just keep the PC, until it crumbles to dust—if only to avoid ever having to go through file transferring again! —*Marc Weilage*

Editor's Note: At press-time, a company spokesman informed the author that the latest versions of The Apple-IBM Connection *will be provided with improved documentation to note the modem switch settings. Also, the PC program will ultimately be updated to provide a machine language version of the PC Reform program; the Apple program will now support modem cards in either slot #2 or #3, and is now capable of using several new types of serial/modem boards including the CCS Card and Super Serial Card.*

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Product Information

A list with product information of some of the programs mentioned here.

PC, Apple, and TRS-80 programs that specifically permit complete data file transfer between systems (ASCII, binary, or both):

Apple-IBM Connection
Alpha Software Corporation
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Smarterm/PC
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The most important consideration when you choose a computer is "what programs will it run?" And that's one more reason for choosing the COMPAQ Portable.

The COMPAQ Portable runs more programs than any other portable. In fact, it runs more than most non-portables. That's because it runs all the popular programs written for the IBM® Personal Computer. There are hundreds of them. They are available in computer stores all over the country, and they run without any modification, right off the shelf.

Imagine the power of a *portable* word processor. There are dozens of different word processing programs available for the COMPAQ Portable.

Planning, problem-solving, and "what-ifs" are a cinch with a variety of popular electronic spreadsheet programs. The COMPAQ Portable runs them all.

There are accounting programs for anything from computerizing your family budget to full-scale professional management of payables, receivables, inventory, and payroll for your company.

There are programs for making charts and programs for communicating with other computers. Or if you want something really specialized, there are even program languages for writing your *own* programs.

So, you get portability and you don't give up problem-solving power. The combination adds up to the most useful personal computer on the market today.



The unique aluminum frame of the COMPAQ Portable has cross-members that strengthen it front-to-back, side-to-side, and top-to-bottom. It's a design practice commonly used in race cars.



The COMPAQ Portable was designed to fit under a standard airline seat so you can take it on business trips.

Works better because it's easy to read

The display screen of the COMPAQ Portable measures nine inches diagonally. It shows a full "page width" of 80 characters on a line so tasks like word processing are easier. And those characters are big enough to read even if you're leaning back in your chair.

The display shows both high-resolution graphics and easy-to-read, upper- and lowercase characters. One screen for all the information. With some personal computers, including the IBM, you can have either the graphics or the legible characters, but you can't have both unless you buy two different displays.

Incidentally, computer prices are often quoted without a display. The display of the COMPAQ Portable is built in, of course.



There are hundreds of useful programs for the COMPAQ Portable because it runs all the popular programs written for the IBM.

Add-on options make it work the way you work

Inside the COMPAQ Portable are three open slots. Electronic devices called expansion boards fit those slots and give the COMPAQ Portable new powers.

Just like the programs, expansion boards designed for the IBM work with the COMPAQ Portable, so there are dozens available right now. With them, you can make your personal computer more personal.

Want to check a stock price? Or look up something in The New York Times Information Service? One expansion board enables the COMPAQ Portable to handle those communications over ordinary phone lines.

Want to use your company's central computer files while you're on a trip? There are boards that allow the COMPAQ Portable to communicate with a variety of large mainframe computers.

Other boards let you hook up controllers for computer games or increase memory capacity. Still others let you connect personal computers in a network so several people in your office can share the same information.



Inside the COMPAQ Portable are three slots for optional electronics that can add new capabilities. Most portables have none.

Works better because it's tough enough for the road

Portable doesn't just mean smaller. Portable means tough, too.

The COMPAQ Portable was built to withstand the hard knocks of constant travel. An aluminum frame within the case completely surrounds the computer's working components. Each disk drive is mounted in rubber shock absorbers instead of being bolted directly to the frame.

To test internal components, the COMPAQ Portable was subjected to impacts of 40 G's *while running a program*. After impacts on each side, there was no internal damage and the program was still running. Without error.

Computers are for getting rid of worries, not giving you new ones.

Designed to help you work better, too

The COMPAQ Portable was designed to *feel* good.

Specifications

Software
- ☐ Runs all the popular programs written for the IBM PC

Memory
- ☐ 128K bytes RAM
- ☐ Expandable to 640K bytes

Storage
- ☐ One 320K-byte minifloppy disk drive, second drive optional

Display
- ☐ 9-inch (diagonal) monochrome screen
- ☐ 25 lines by 80 characters
- ☐ Upper- and lowercase, high-resolution text characters
- ☐ High-resolution graphics

Expansion board slots
- ☐ Three IBM PC-compatible slots

Interfaces
- ☐ Parallel printer interface
- ☐ RGB color monitor interface
- ☐ Composite video monitor interface
- ☐ TV RF modulator interface
- ☐ Communications interface optional

Physical specifications
- ☐ Totally self-contained and portable
- ☐ 20"W × 8½"H × 16"D

The keyboard is detached so it can fit into your most comfortable working position.

The keyboard cable remains connected at all times. So you don't have to unpack it and hook it up every time you use your computer.

Because the display is built in, the COMPAQ Portable makes a neat, small package on your desk, instead of a big obstacle you have to talk around. The built-in display also avoids the usual cable clutter because there's no need for separate cables for the display.

The COMPAQ Portable even has an electronically synthesized sound to create the familiar keyclick of a typewriter. With a simple keyboard command you can adjust the volume to suit the level of background noise in your office.

The added usefulness is free

The COMPAQ Portable can do what desktop computers do and do it in more places. But it doesn't cost any more than an ordinary desktop.

In fact, it costs hundreds less than a comparably equipped IBM or Apple® III. The COMPAQ Portable comes standard with one disk drive and 128K bytes of memory, both of which are usually extra-cost options. A second disk drive and additional memory are available to make your COMPAQ Portable even more powerful.

The bottom line is this—you just can't buy a more practical, useful, productive computer. Before you decide on a computer, you owe it to yourself to compare the COMPAQ Portable.

For the location of the Authorized Dealer nearest you, call 1-800-231-9966.

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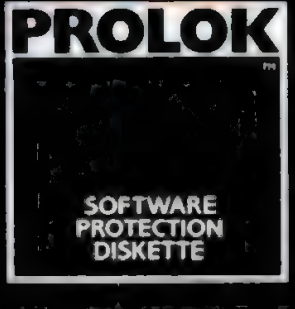


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Created by a special, patent pending manufacturing process, each PROLOK Diskette is unique.

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PROLOK Protection is invisible to the legitimate user. Back-up with normal system utilities. Protected files may be transferred to and from hard disks.

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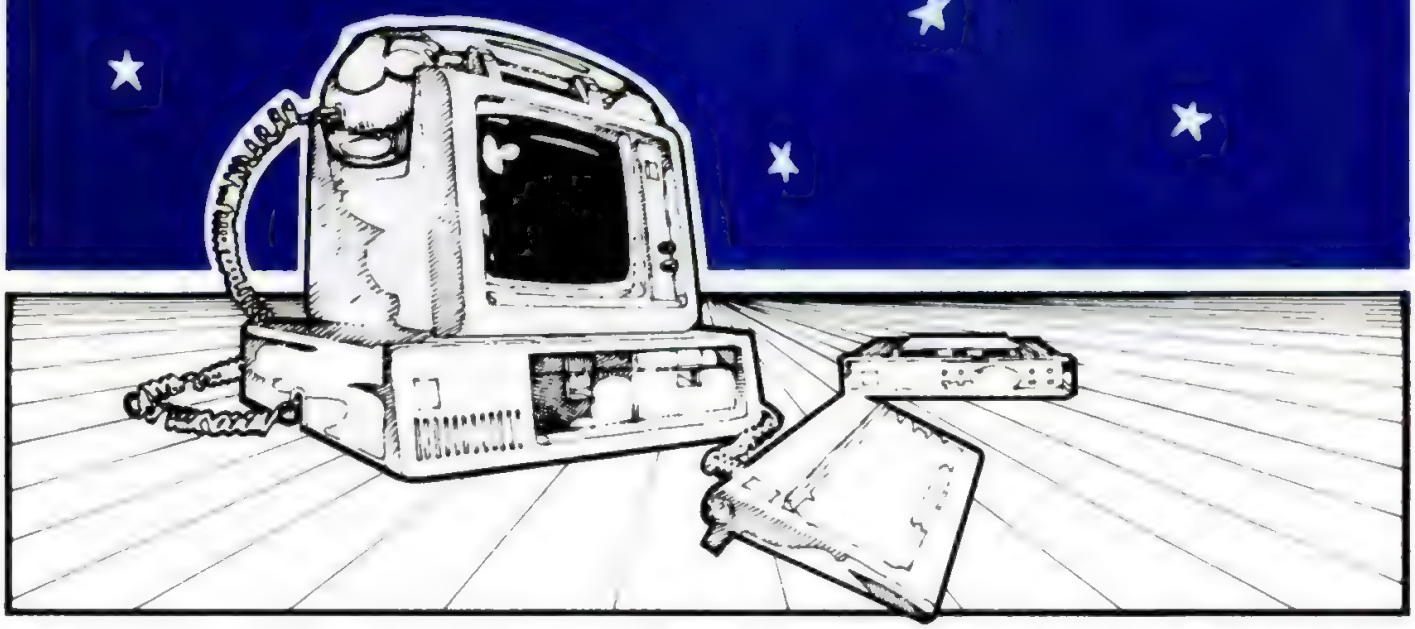
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PCAT IS EFFICIENT

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- Reschedules busy/no answer calls
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- Built in word processor for order confirmation, letters or memos
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You'll be surprised just how cost effective PCAT can make your new or existing telemarketing operation. PCAT reduces your marketing costs, increases productivity and ensures that every contact can be followed up by callback, confirmation, or order entry.

PCAT IS EASY TO USE

In addition to automatic scheduling and dialing, PCAT uses function key prompts and help screens to guide you through the program. A comprehensive User's Guide is provided.

WHO NEEDS PCAT?

- Retailers
- Insurance Agents
- Stock, bond and commodity brokers
- Wholesalers and distributors
- Customer service or support depts.
- Real estate agents
- Accounts receivables depts.
- Collection agencies, etc.

HARDWARE REQUIREMENTS

IBM Personal Computer with 128k, at least one diskette drive, 80 column monochrome or color monitor, and a Hayes Smartmodem or Novation Smart-Cat. Printer is recommended.

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IN THE FLAT WORLD OF NETWORKING THERE IS A COLUMBUS.



NOVELL.

We Know How You Felt, Columbus!

In 1492 most people were saying the world was flat. They said, "You'll fall off the edge if you go too far." But that didn't stop you Columbus. You went ahead and discovered America.

Today, most people are saying, "file service...is just not feasible."* They're even saying, "operations like record locking are not available."** But that hasn't stopped Novell, either. Because we've gone ahead and discovered, designed, yes... even built and shipped file servers that the less adventurous said couldn't be built. And our file servers are up and running all over America, (not to mention the rest of the world.)

Our Versatile Applied Server Technology (VAST) lets multiple operating systems on multiple types of personal computers share the same disk space and directories simultaneously.

And yes, all you other guys, record locking is available ...on the ShareNet/VAST system, anyway.

Discover the vast ShareNet Difference.

The trouble with the "civilized" world of networking offered by our competitors is that they are still thinking FLAT! They're still concentrating on the hardware connection instead of the software that makes that hardware function. Just like Columbus, Novell is the ONLY company that can offer you a VAST networking difference. We're thinking round, you see.

Does choosing a network have you "on edge"?

Don't fall off the edge! If networking—we mean real local area networking of numerous PC's, running multiple operating systems without modification to "off the shelf" software, having concurrent file sharing, default file locking, extensive data security and more—sounds exciting to you, call us for a demonstration so you can discover your options. ShareNet/VAST will take you out of the "flat" bounded network world and into the boundless universe of networks that work.

Explore Novell's world!

Discover the *vast* ShareNet difference. You'll find out-of-this-world performance at very down-to-earth prices. ShareNet/VAST is easy to use. All you have to do is call us and we'll set sail on a course that solves your PC networking problems. Get on board with the Columbus of networking. Novell, Inc., 1170 North Industrial Park Drive, Orem, Utah 84057, 801 226-8202 • 800 453-1267

Novell—making networks work.
Our VAST difference.

NOVELL

*3Com Corp. in *March Systems & Software*, pg. 118
**3Com Corp. in *March Systems & Software*, pg. 119

CIRCLE 461 ON READER SERVICE CARD

Famous Lost Words.

In December 1922, on a train from Paris to Lausanne, everything important Ernest Hemingway had written — except for pieces already in print plus two short stories — was lost forever in one brief moment.

The Moral Is: If You Respect It, Protect It.

In 1983, countless hours of precious writing will be lost to word processing programs that cannot save text from a system crash.

Only one word processing program can. The FinalWord.

If the power to your personal computer surges or suddenly goes off, The FinalWord saves your text. When the power comes back, so does your immortal prose. Even text you delete can be recalled.

And there's more. Like split-screen editing, that lets you work with several documents at the same time.

Like true proportional spacing on all printers. And footnotes, indexes and table of contents – referenced, numbered and formatted automatically! Features that expand your creativity while increasing your efficiency.

PC Magazine calls The FinalWord, "one of the most powerful and versatile word processing programs available." And you can get it for most computers, including the IBM and Apple CP/M.

Call 617-576-2760 for more information and a free brochure.

The FinalWord

All there is to say about word processing.

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Protect Your PC!

Dirt, dust, and smoke can effect the successful operation of your IBM PC,* even shorten its useful life.

Now you can protect your PC from these damaging airborne particles with our custom designed disk and keyboard dust covers.

CompuCable Corporation, a leader in the manufacture and distribution of computer products and accessories, has produced these handsome dust covers with you the PC owner in mind.

We know that you value your PC, so we've made both covers of high quality, smoke colored plastic that will protect your PC for years to come. We've also engineered them to enhance the natural beauty of the IBM PC.

Best of all, this durable dust cover set can be yours at a surprisingly affordable price.

You depend on your PC to fulfill your information processing needs. Protect it!

For information on where to get the IBM PC dust cover set, call us at **800/222-2332. In California call 800/821-0684,** in Alaska and Hawaii call 714/635-7330. Dealer inquiries are welcomed.

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Developing, manufacturing, and distributing quality computer products and accessories.

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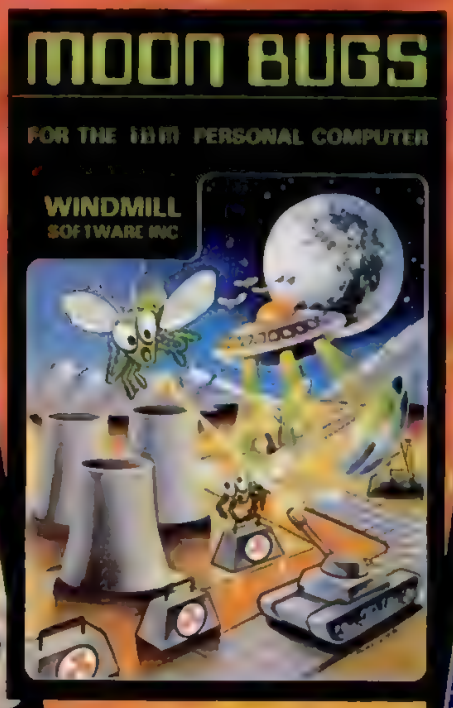
New Exciting Arcade Action!

FOR YOUR IBM PC



The Exterminator

Test your skill and reflexes against the hoards of bugs infesting your castle. With spray gun ready, you exterminate the gnawing termites, army ants and deadly spiders.



Moon Bugs

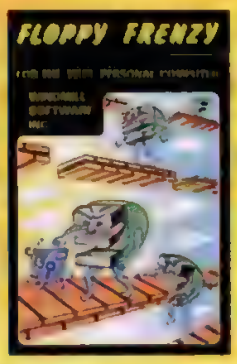
Radioactive bugs are hatching within the moon's nuclear waste zones and are approaching to consume Earth's uranium deposits required to power your nuclear reactor. You must stop them with lead oxide projectiles while dodging falling nuclear debris and indestructible energy pulsars.



Styx

The bewitching, swirling STYX has laid seige on the vast expanse of your playing field. Aggressively, you venture into its territory to stake your claim. With every advance, your stronghold grows forcing the retreating STYX into the last remaining corner. You need determination, quick reflexes and innovative strategy to defy the mesmerizing symmetry of the STYX. Optional joystick or keyboard control.







And there's more!

Windmill Software products are written entirely in machine language to take maximum advantage of your PC's superior capabilities. Created originally for the IBM PC, we naturally include the features you're looking for — game pause, sound on/off, multi-levels of play and much more.

Requirements: Color graphics adapter, 64 K memory.

Price: **$39.95** each

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A Great Software

FriendlyWare PC Introductory Set

VOTED THE 5TH MOST POPULAR IBM SOFTWARE ON THE MARKET IN SOFTALK MAGAZINE'S RECENT READER SURVEY.

MONEY magazine described the Intro Set as one of the two best learner programs available for microcomputers.

PC magazine said it "had to be seen to be appreciated".

According to SOFTALK, "the implementation and sophistication of the Introductory Set are superior to anything available in the public domain".

The Intro Set is a must for novice users, but it's a lot more than just a starter set. Even seasoned pros are finding things they like among the 4 demo programs, 17 games, and 8 utilities on the package.

Some are even saying that several individual programs on the set (such as the Personal Check Book on disk #3) are worth the price of the package all by themselves.

SUGGESTED RETAIL $49.95

FriendlyWare PC Arcade

They told us that IBM'ers wouldn't buy games; but our customer feedback told us otherwise.

When the first two PC ARCADE production runs sold out before they shipped, we knew our customers were right.

PC ARCADE is a solid lineup of 10 fast-action arcade games for the IBM PC.

ASCII MAN, EAGLE LANDER, STAR FIGHTER TX-16, SHOOTER, BRICK BREAKER, GORILLA GORILLA, ROBOT WAR, BUG BLASTER, HOPPER and PC DERBY.

All 10 were written in Assembly language for speed and Text Mode for use on monochrome OR color monitor.

All games feature a PAUSE BUTTON and BOSS IS COMING KEY, and all but one of the games (EAGLE LANDER) can be controlled with EITHER a joystick or the keyboard.

And best of all, you can play them forever on five rolls of quarters.

SUGGESTED RETAIL $49.95

FriendlyWriter (with FriendlySpeller)

Combine the best little letter writer you've ever learned to use in 10 minutes, with a fast and accurate spell checker that compares your letter with a 30,000+ word dictionary, and you've got one of the greatest things to happen to word processing since the INSERT and DELETE keys.

FriendlyWriter is designed specifically for the kind of word processing you need the most – the 1 to 6 page business or personal letter. And using FriendlyWriter is as easy as striking a key.

FriendlyWriter (with FriendlySpeller), the only word processor in the world with a 30,000+ word dictionary that sells for under $100.

SUGGESTED RETAIL UNDER $70.00.

B Great Prices

The days of the $495.00 "Watzitdo?" software package are over.

The same is true for $39.95 one game packages.

Software pricing is coming down out of the clouds, and today's software consumers are proving once again that the old American business ethic of "producing a quality product at a fair price" still has merit.

At FriendlySoft, our objective has always been to give you the products you want, in a format that you can use and appreciate, at a price you can live with.

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C THE BEST Great Support

No other software company in the world backs their products as completely and as simply as we do.

The FRIENDLYWARE "NO FINE PRINT" LIFETIME GUARANTEE states:

"If your master diskette fails due to normal use, we will replace it, AT NO COST, within 48 hours of receipt of your original master.

If your master diskette fails due to abnormal use (staple in media, food on hub ring) we will replace the programming onto your diskette within 48 hours of receipt of your original master and a blank, unformatted, diskette.

We also offer a unique 24 hour hotline, where you get quick answers, instead of taped messages.

In short, FriendlySoft is the unchallenged leader in software product support. And we intend to stay there.

There are three good reasons why we're called "one of the fastest growing software companies in the business"



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Producers of innovative, quality software products
EXCLUSIVELY for the IBM Personal Computer

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UNBELIEVABLE!

XCOMP sat down to design a truly distributed IBM network so versatile and complete that it would satisfy any user's needs.

It seems too good to be true, but **we did it!**

X-NET is so advanced that it can only be imitated. It has all the features of standard networks and many more. And, because it is **not dependent on a central file server** you save the high cost of that hardware.

Call our sales department today for complete details on **X-NET**. The **exclusive** network of PC-DOS 2.0!



X-NET

A Network Superset of PC-DOS 2.0

Other quality products available from XCOMP.



CONTROLLERS

XCOMP manufactures a complete line of controllers for all popular drives. The X/R Series is a controller for 3 to 300 megabyte drives.

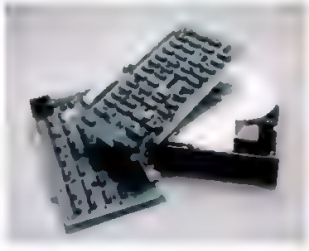
We also produce a S100 controller package. A microprogrammable data board is common to each package and operates with a second drive interface board. Buffer size is 256 bytes, with disk data rate up to 10MHz.



HARD DISK SUB-SYSTEMS

10 megabyte and 16 megabyte hard disk sub-systems for the IBM PC, Apple II and III and nearly all popular personal computers.

XCOMP sub-systems are 2 to 3 times faster than many of the competition's and come complete with our extensive software.



PACKAGE DEALS

Exceptional prices on 10 and 16 megabyte formatted drives and controllers. The ST/S for S100 computers and the ST/R for single board computers. An optional Z-80 adapter allows for simple plug-in convenience. Optional equipment includes software, cables and cabinetry.



THE TOASTER

THE TOASTER is a hard disk sub-system containing TWO REMOVABLE 3.9", 5 megabyte cartridges. THE TOASTER provides unlim storage and conveni back-up with tot portability. V speed ar disk

THANK YOU FOR YOUR OVERWHELMING RESPONSE!

We are substantially back-ordered on TOASTERS. We appreciate your patience!

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Microcomputer Scale System.
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A way to cut postage that carries a lot of weight.
The PC Weighmate computes postage rates for letters and parcels instantaneously, either by USPS, International, UPS or Federal Express. It does it with its unique disc software and with a super-accurate 25-lb. capacity electronic scale platform that easily plugs into an available slot.

"Rate Shopper"—Send it the best way—for the least.
Gone are complex rate charts and errors of adding more postage "just to be sure." The "Rate Shopper" feature displays the least expensive or quickest way of shipping a package to any zip/zone in the United States. And, as the rates change, so do the floppy discs. We update them whenever necessary.

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With PC Weighmate's amazing software. It offers business solutions superior to most available electronic scales that cost thousands of dollars more. PC Weighmate has other uses too. Precision weighing and piece counting with resolution of 1 part in 50,000. PC Weighmate is attractively priced and can pay for itself in just months by eliminating postage errors and increasing productivity.

The system with a following.
Micro General, the largest supplier of postal computing scales to the U.S. Postal Service, is a leader in microcomputer scale technology. That's why we've scaled up the two world leaders in personal computers!

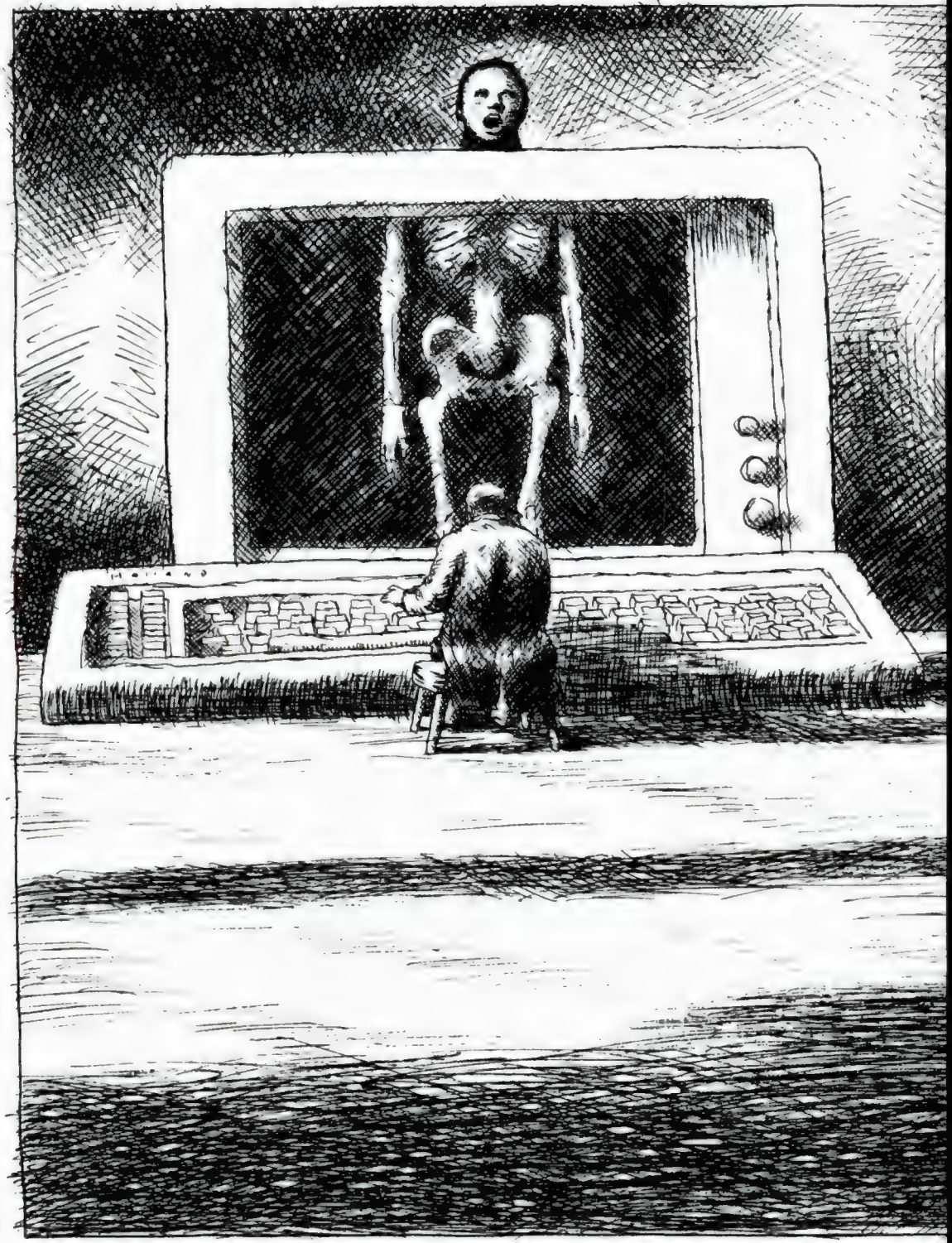
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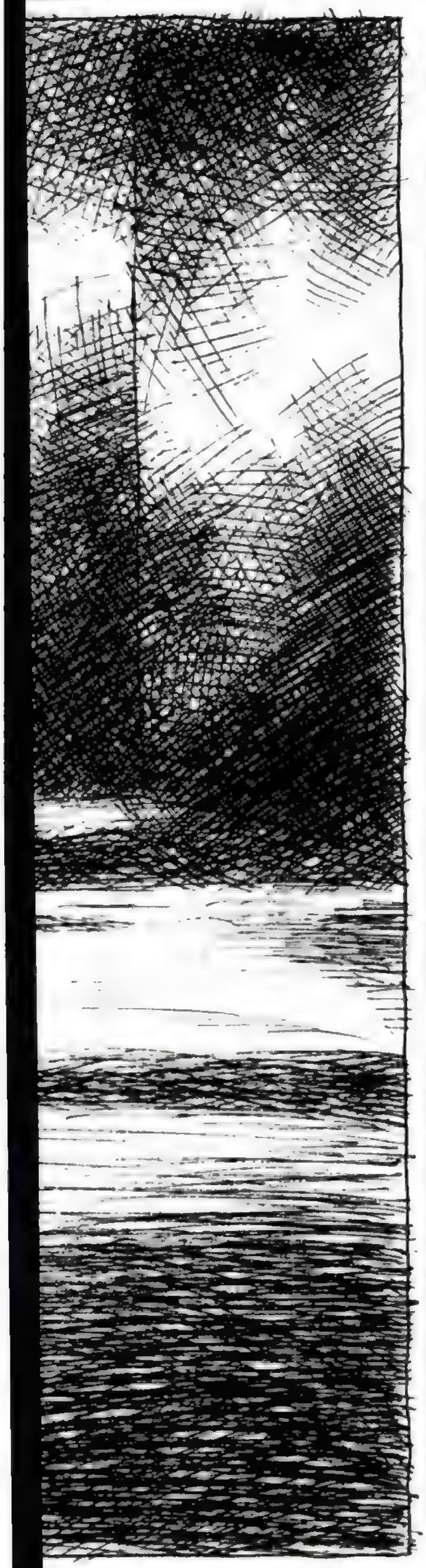
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Booth 488

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IBM EYE/STEPHEN MANES

IBM may employ the ghost of Charlie Chaplin for its ad campaigns, but the manufacturer is less than comfortable with ties to modern-day Hollywood.

Why The Good Guys Don't Use PCs

Where in the world can you find bad guys who use black computers that look suspiciously like IBM mainframes, good guys who use kludged-together spare parts, and nobody who uses the IBM PC? Where else but Hollywood?

A kid computer hacker nearly blows up the world with his ancient IMSAI machine in the movie hit *WarGames*. The new TV season brings us a CBS series called "Whiz Kids." It's not a nostalgic sitcom about the 1950 Philadelphia Phillies and Robin Roberts, but an adventure show starring a band of suburban high-schoolers who solve mysteries with the help of a talking home-brew computer named Ralf.

Terminal Wizardry

In another era, the show might have been called "The Hardy Boys Get a Computer." The pilot program I screened included the obligatory dog-digs-up-a-human-skeleton scene as well as the classic late-at-night-in-the-cemetery segment. But there was also stuff the Hardys could only have dreamed of doing.

Peering through thick-rimmed glasses that make him look like a young Clark Kent, Richie Adler (played by Matthew Laborteaux) can perform magic with just about any terminal he sits before. In the pilot show I saw, he taps into a real estate title company's database using a classroom Apple III and gets his beloved Ralf first to page him through the school's main computer and then search through the county's database of vital statistics. During that laborious search—in the show's best sight gag—Ralf's robot arm feeds Richie a sandwich.

Fortunately, Ralf is not some cuddly machine ready to be marketed as a cute plush-talking doll ("En-ter yo-wer password puh-leeze."). He turns out to be little more than a mostly unseen box with the usual peripherals, plus some video-digitizing equipment and that robot arm.

Illustration by Brad Holland

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Unauthorized Entry

Still, all that "unauthorized entry" made me a little uneasy. I had grim visions of kids across the country clamoring to get Dad to buy them fancy computers, giving their machines cute names like "Fido," and using them to siphon money from their teachers' meager bank accounts to their own. I'd also heard rumors that IBM PCs would play a supporting role in the show and wondered why they were missing from the pilot. The closing credits thank everybody from Atari to Xerox, but Big Blue is conspicuous by its absence. Passing through Los Angeles, I called on the "Whiz Kids" executive producer and co-creator, Phil DeGuere, in his office on the lot of Universal Studios to find out more.

The office is not on the standard Universal Studios tour, but maybe it should be. Out in the waiting room, I detected the dulcet clatter of a NEC Spinwriter, muffled under a sound-reducing hood. I was ushered into the inner sanctum where I found DeGuere, who resembles a jovial bear, busy downloading a script at 300 baud to his COMPAL computer.

God and the Apple

It turns out that DeGuere, who also created the "Simon and Simon" series, has been a bit of a hacker himself. When his wife bought him an Apple a few Christmases back, he "thought God lived inside the machine." Like most of us, he quickly learned otherwise and incidentally discovered the connection between computers and kids.

"I found myself going to the computer store, and I'd go to ask a perfectly logical question, and the guy who owned the computer store would say, 'Well, I don't know.' And I would say, 'Wait a minute, you sold me this machine. It's $2,000 worth of equipment. You don't know?' And he'd say, 'No, I don't know.' I'd say, 'Is there a book where I can read about it?' and he'd say, 'I don't know; maybe you can call Apple'—which I did. And they said, 'I don't know.' And it finally came down to the fact that the kids hanging out in the computer store were the only ones who had the answers."

During an actors' strike, DeGuere spent 6 straight days writing a "very simple database manager that just handled the ingredients in a recipe. By the time I finished debugging it, the last thing in the world I wanted to do was use it."

Ferrari-writers

The experience didn't faze him. "When I went back to work after the strike, I had a huge workload. It suddenly hit me: I've got to get a word processor. I woke up one morning and it was like new-car fever. I had to have one right away."

Like most writers who've made the switch to word processing, DeGuere is ecstatic about it. "An IBM Selectric II is a Volkswagen," he puts it in a metaphor that reinforces everything we've always believed about Californians and cars. "A word processor is a Ferrari."

He doesn't run COMPAL's word processor on his current system, because

AN IBM Selectric II is a Volkswagen. A word processor is a Ferrari.

"when you're working on it, it doesn't look the way it looks when you print." Instead, he uses the CP/M version of *WordStar*, along with a program called *Scriptor*, which takes a *WordStar* file and turns it into a finished script in the peculiar format the film and television industries require.

Power Up!

That system's about to be replaced. "We're moving to a local network with a large hard disk, a hard-wired local area network here, and short-haul modems connecting other buildings around the studio at 9600 baud, and a big virtual disk—about a megabyte and a half. The manufacturer is Action Computer Enterprises (ACE) and the computer is called an S-100 machine. We're going to use Wyse 8-color terminals and keyboards customized for *WordStar*."

The whole thing will have a backup power supply. As DeGuere puts it, "When we power the system up, I hope we'll never turn it off." With good reason. "*WordStar, Scriptor, dBase II*, a dictionary, a thesaurus, and any other program that we require will all be loaded into the virtual disk and stay there. Then each user can open files that can be accessed only by him until he is ready to release them. That way the writers don't feel like somebody's looking over their shoulder all the time. When the files are released and become open, all the rest of us can read them.

"There will be a fairly sophisticated printer buffer so that there is no downtime. We'll probably have at least three or four printers, two tractor feeds for scripts, one printer for letterheads, and one dot matrix for real fast stuff. I sincerely hope our electronic mail function will be a real timesaver. We will be able to read material on the screen, then send memos to each other instead of getting together for meetings, thus eliminating an incredible waste of time. We'll have a floppy backup system, probably somebody in the office to maintain that and make the backups. And then the present hardware that we're using will be shipped to the writers' homes and the secretaries."

About the Whizzes

DeGuere obviously knows a few things about computers. I asked him about the series.

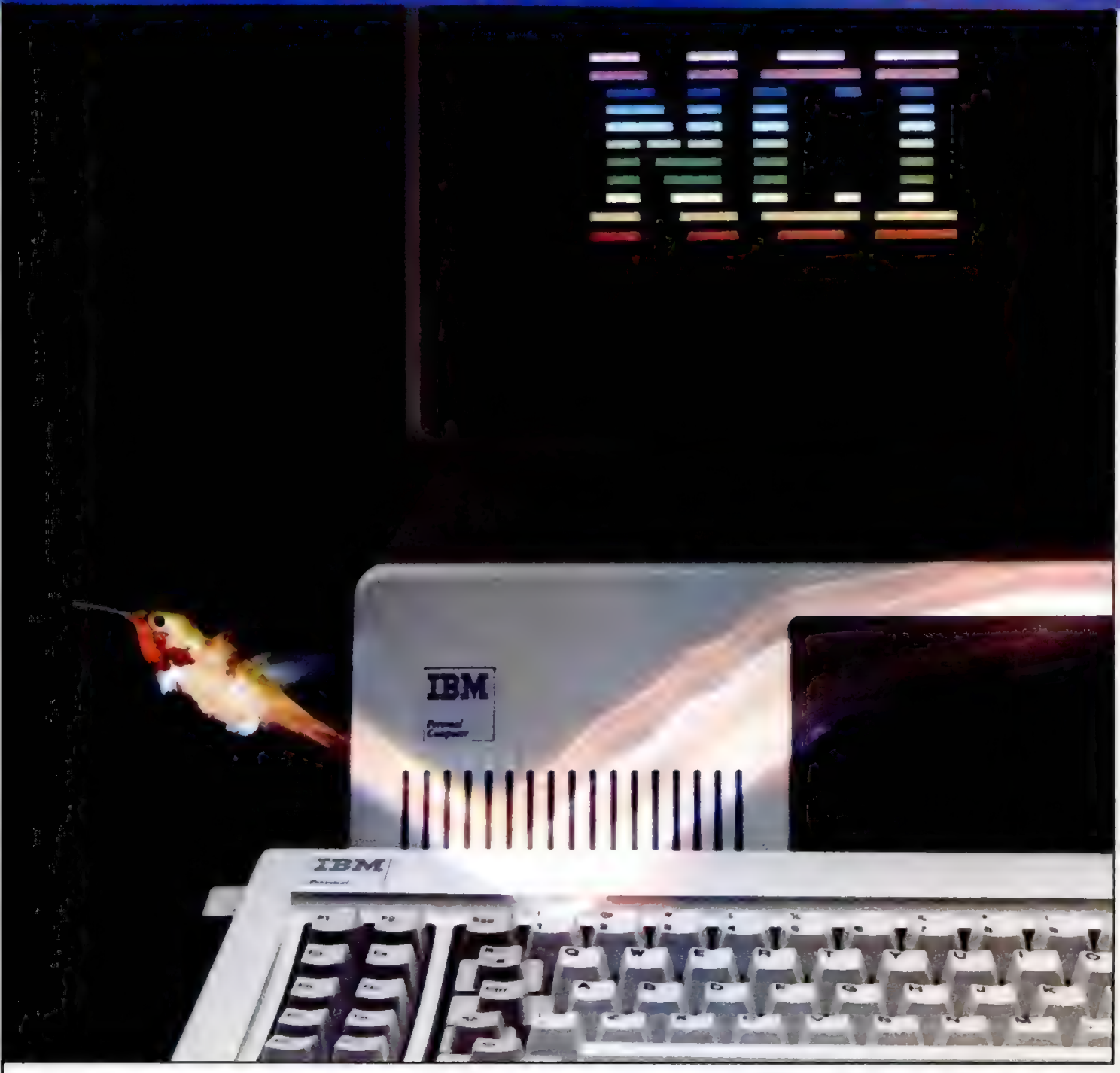
"The kids are high school students, and they have a rather keen curiosity about things. They have formed an association with a newspaperman who's in his late 30s and whose understanding of computers is probably limited to his use of a word processor in his office. If they saw something really weird, they might go to the reporter and say, 'Farley, I think that guy's a spy for the Russians.' On the other hand, Farley's just as likely to come to Richie and say, 'I've got this license plate, and I've got three letters and one number, and the DMV won't run it for me, but I got them to give me the access code. Would you try and figure out a way to do it?"

"We're kind of tripping lightly over the question right now of unauthorized access into other computer systems, which has created a bit of a flap."

Paranoia Cherished

Access—the very subject that had piqued my curiosity! DeGuere elaborated: "I think I have a gut feeling for what is right and what is wrong when it comes to the issue of accessing other computer systems without authorization. For instance, I don't presume that there is a great deal of

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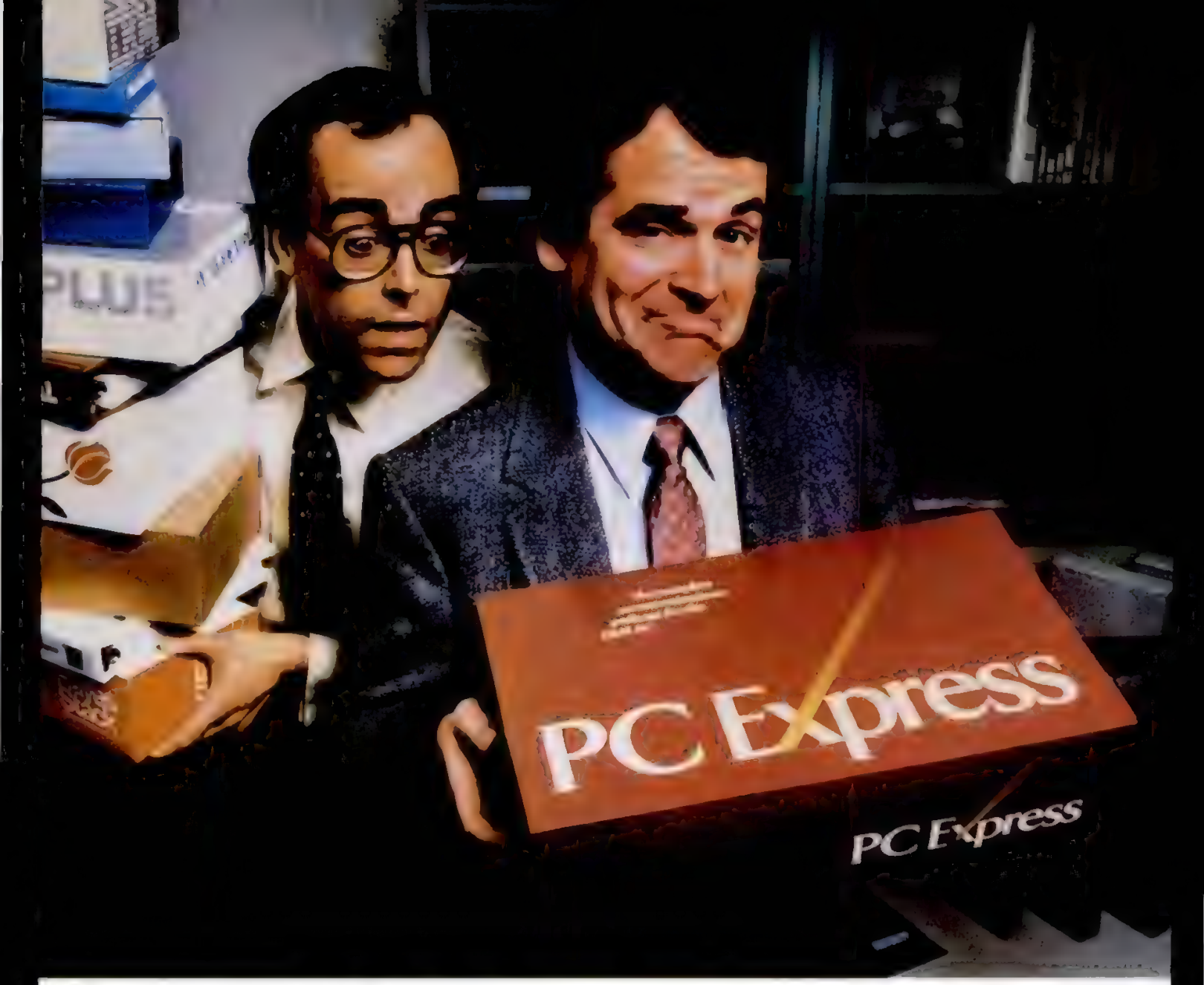
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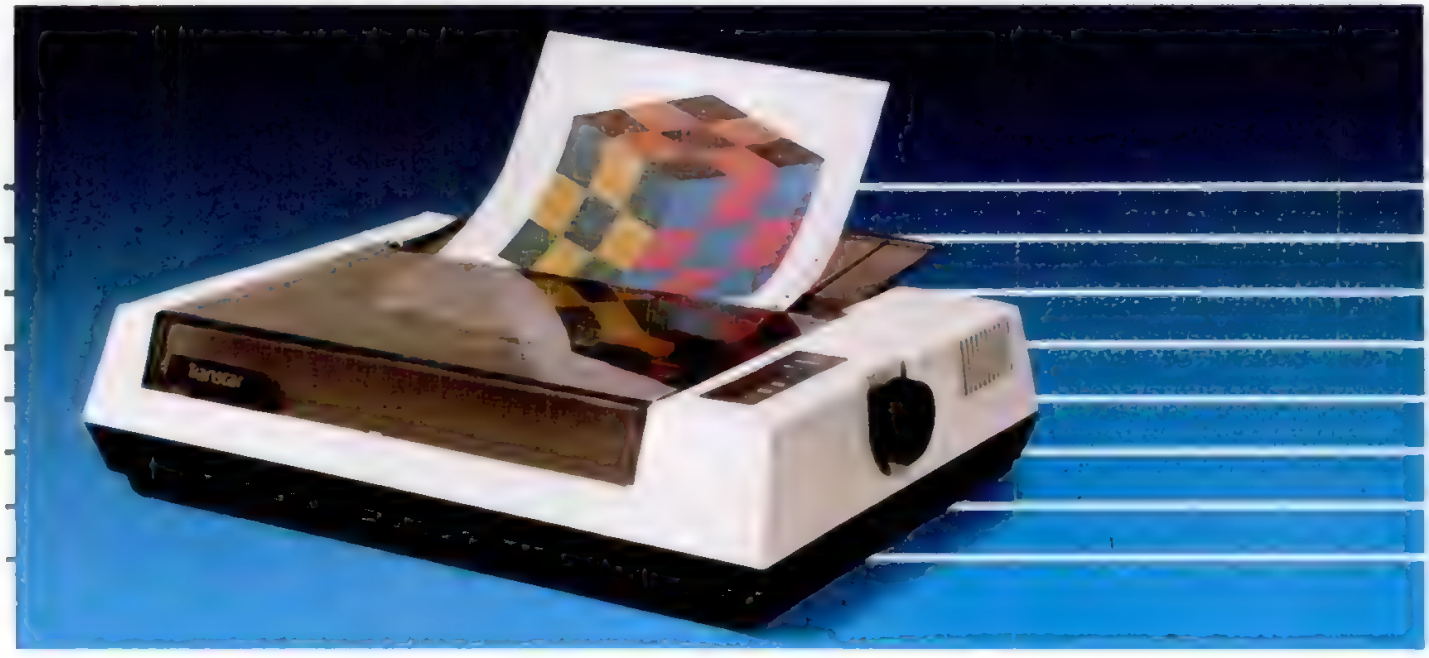
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privacy in the world. I don't go around thinking that unauthorized people can't get my driving record or things like that. So the idea of somebody flipping through the DMV files looking for some information that might pertain to me doesn't bother me. I kind of assume it's happening anyway. I tend to sort of cherish paranoia theories.

"I believe that the existence of computer networks and vast databases suggests that some things that we've taken for granted shouldn't be taken for granted anymore, that we're on shifting ground in society right now, and that it's probably a good thing that there are hackers who are cracking these systems, even though what any one hacker does may or may not be defensible.

"I don't think any hacker who gets into a computer system and crashes the files and renders it inoperable is doing something that should be commended. I'm not sure that a hacker who cracks a system because it's a challenge, and having done so and having learned more about the architecture of CPUs or operating systems or codes or stuff like that without doing anything harmful, is really a person to be scorned or frowned upon. I'm not sure about any of these things. I do know on a case-by-case basis how I feel."

Unethical Manipulation

What kinds of cases?

"I felt that the kid in *WarGames* who changed an F to a C was bad. I didn't like it. I though it was simple, simplistic, and unethical manipulation of an immature audience. If it had been a D or C, and he had changed a C to a B because if he didn't get a B, his mom wouldn't give him a hundred dollars to buy a new board for his machine, I would have bought that, and I think the kids would have cheered just as easily. But if you're flunking a class, you're going to have to take that course over again. This kid just deprived himself of the whole body of knowledge that whole course represented.

"In my show, Richie accesses the newspaper's computer, and the reporter says, 'Richie, I told you not to do that.' And Richie says, 'But you told me to call,' and the reporter says, 'On the telephone, Richie.' Another time he accesses a computer system, and he gets caught by his teacher, who calls him forward in front of the class, and—although we didn't shoot the scene, because it would've been boring—clearly is going to reprimand him in front of the class and say, 'This is not what you're supposed to do.' Those things don't bother me. They didn't bother me when we were making the pilot, and they don't bother me now.

Learning Experiences

"The issue of whether it's good, bad, or indifferent is really something I'm not sure about. In terms of knowing what's right and what's wrong and what's good and what's bad, I think we're going through a transitional period where maybe a series about these kids, and others who are doing things they aren't supposed to do, is probably a good learning experience for everybody."

Really? How would DeGuere enjoy the learning experience if a kid got illegal access to his super-duper new system and walked off with the shows?

"It wouldn't bother me in the slightest," he replied without hesitation. "If a kid came in and crashed our files—even then I wouldn't be that mad. Because I've got to back them up. I mean, if I don't have backups, it's my fault. I don't expect people to go around just respecting these things per se. People come in here and steal equipment from time to time. I don't like it, but it doesn't outrage me. I feel if we can catch them, they should be caught, and if punishment is appropriate, they should be punished. If I were going to portray it, I would portray it that way."

Glass Houses

What if the studio gained access to his financial records around contract negotiation time?

"I don't presume privacy. Maybe I'm weird. First of all, I am convinced that this office is bugged, that the phone line is tapped, and that somebody is watching. I live in a house that's glass—I mean, it's literally 90 percent glass—and I do

Matthew Laborteaux and Melanie Gaffin (front), and Todd Porter, Jeffrey Jacquet, and Andrea Elson (rear) star in "Whiz Kids."



assume that there is very possibly somebody watching me walk around naked in my house. And if that's what they want to do, fine. It doesn't bother me. I know that they can't sneak up on me without my seeing them. This is a weird world we live in. If I wanted privacy, I'd go someplace that I knew was really private. As it is, I just assume that somebody's listening.

PEOPLE WHO are familiar with computers will recognize that certain things on the show are "patently impossible."

"We—the staff of the show, the studio, and the network—have been considering these questions a lot lately. As of right now, it appears that we have a consensus."

DeGuere dug up a sheet of paper from his cluttered desk and read a semi-official statement on the subject. " 'The creators and producers of "Whiz Kids" are fully aware of the responsibility to present our stories in a manner that fosters among young people a clear understanding of their obligations to obey laws. If there is any instance in which any of the young protagonists use computer access in a manner of questionable legality, this fact will be made apparent, it will not appear that the act is condoned, and they will be suitably and quickly reprimanded.' So far, that's our position.

"I, frankly, am beginning to think, from seeing the scripts develop, that we may have come up with some much better ways of telling our stories without the necessity for illegally accessing other computer systems. But I think it will happen from time to time, and I think that when it does, it will be handled in a very responsible manner and one that deals with it accurately."

Accuracy and Excitement

I wasn't entirely convinced. How accurate does the show plan to be? "The object of the show is not necessarily to be accurate, but to *feel* accurate." People who are familiar with computers will recognize that certain things on the show are "patently impossible," DeGuere admitted, but the scenes in question will still "feel right even to people who know they're wrong," he added. And to people who are not familiar with computers, it will really look like they're getting a glimpse into the way computers and hackers function."

DeGuere pointed out that it's not easy to make computers exciting on the screen. "What happens when a person sits at a computer terminal is a pretty interior thing. To try and dramatize it and make it appear active and bring the audience into it in a way that is meaningful and also accurate, or relatively accurate, has been quite a challenge.

"The show has been designed to do the same thing for computers that ET did for extraterrestrials, which is to stop making people hate them and think that they're monsters and to see that they're really lovable and cute, and just really sort of stupid. They only do what you tell 'em to do. They just do it very quickly. And I believe for those people who are somewhat intimidated by the machines, that's exactly the effect the show's going to have, whereas people who are familiar with computers seem to enjoy it simply because it sort of explores all those possibilities you wondered about."

The PC Mystery

Speaking of possibilities, what about the PC? What's its role in the show?

"We don't have any contact with the IBM PC at all," DeGuere informed me.

Ripping up three full pages of questions about such things as DOS and video synch and all the nifty color graphics boards and monitors the show might be using, I squeaked, "Why not?"

"We're not in the business of buying the props that we use in the show," DeGuere answered. "All of the props, whether they be working computers or shells, are loaned to us by the companies. We debated seriously about the PC and the Apple, and the reason we didn't choose the PC was a conversation I had with IBM.

"I submitted the pilot script to them, and I said, 'We are looking for certain kinds of support, primarily the loan of some equipment on the one hand, and possibly some insight into your R and D and stuff like that.' We're working on about a 4- or 5-month lag, and the things I photograph today should still be hot 5 months from now.

"IBM said, 'We never expose any new product until it's ready for market—it's an absolutely firm corporate procedure—because we have found that any time there is a situation in which an IBM product is shown in such a way that a customer of ours can see it doing something, they're going to call up and want it.' IBM doesn't leak anything."

I nodded sympathetically. IBM wouldn't offer a sneak preview of a new system to defuse enemy nuclear warheads even if they were about to fall on Boca Raton.

He Saw It Fly

DeGuere continued: "I said, 'Okay, I understand that. Read the script and let me know.' So a woman called me back, and she said, 'We like the script. We will give you permission to use IBM equipment and display the IBM logo, which we have never given anybody in a fiction film since before *2001*.' Corporately, IBM was very unhappy at the way the computer, Hal, was portrayed, and it was so angry about it that it didn't want to have anything to do with movies.

"She said, 'The only thing we insist on is that you not show our equipment being used to access another system without authorization, and that you not show the equipment doing something that it does not actually do, so we do not have the problem of a customer calling up and saying he saw it fly. Now, you wanted us to loan you some equipment, right? Are you a nonprofit organization?' To which the

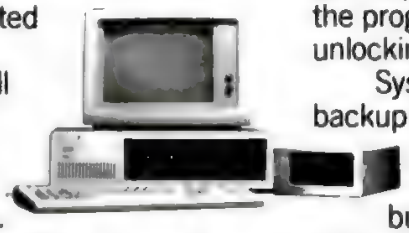
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response had to be 'Well, we're not supposed to be.'

"I said, 'No, this is not a nonprofit organization. This is a very greedy capitalistic organization.'

"She said, 'Well, then, it's impossible. We simply can't loan you anything. If you were a nonprofit organization we would loan you—*give* you—anything you wanted, but if you're a for-profit organization, we can't.' "

IBM: Worried

"I said, 'Gee, I don't understand. Why? It seems to me that it would be a wonderful opportunity for you to expand your market base.'

"She said, 'Let me tell you something. In the year the IBM PC was introduced, it went from a market share of zero to 28 percent. You have to understand something about IBM. First of all, IBM salesmen will never call on you unless you ask them to. And if an IBM salesman walks in and sees another system by Burroughs or DEC or Xerox or whatever, he will not comment on that system. He will not say our system is better or our system does different things. If you ask him to evaluate the IBM system in comparison to the other system, he won't do it. All he will do is tell you what the IBM will do, what it costs, when you can get it, and things like that.'

"I was wondering what she was getting at. She said, 'Now, you've got to realize that the PC captured 28 percent of the market share in the year that it was introduced. Now, we at IBM are very worried about companies like Radio Shack and Xerox.' At that time, the rumor was all over the industry that Xerox was in big trouble.

"I said, 'Xerox is going to be well represented in this show. If you're worried about Xerox getting more of the pie. . .' She said, 'No, you don't understand. We're worried about Xerox going out of business.

'Just think for yourself. Now, in one year, IBM took 28 percent of the market. What do you think would happen if a company like Radio Shack or Apple folded?'

"I said, 'Government. Antitrust.'

"She said, 'Right. You get the picture.'

"I said, 'Yes, I understand. I won't call you up again and ask you to loan equipment to me.'

The Bad Computer

But PCs have put in cameo appearances nonetheless. "We did use a lot of IBM stuff in making the show, but we either paid for it, or borrowed it from the data processing department. There are two big IBM systems here, and the guys are all tickled to get involved. It's very funny, because they've been working on the fringes of the movie business doing things like charting profits of films and stuff like that, but nobody ever came to them and said 'Guys, let's do some stuff here.' They've had a lot of fun and so have we, and they've been a great help to us.

"We used this intense IBM terminal with a beautiful display—a big four-color terminal. The EDP guys used a program called *Roscoe* to generate screens for us. That was the one that we were able to get close enough on—photograph sharply enough—to read it on a televison set. I have to say I was really impressed with the quality of it in comparison to anything else.

"We also used a Xerox 1100, which is a $50,000 stand-alone unit. It's a dynamite machine. It's the one that all the development was done on that was ripped off for the Lisa and used for the Star, with all the overlays and all the icons and all that.

"We actually ended up disguising the IBM. The story pits the kids against a bad corporation called NASCorp—which stands for Nasty Corporation—and they all had to have black computers. I got this idea because I saw a TICOM—a black computer from England.

"So every NASCorp computer terminal is black. The Grid was a NASCorp computer, because it's black. But the IBMs weren't black, so we had to go and wrap them all in black contact paper. In so doing we obliterated the IBM logo, even though, in truth, I don't think we had them doing anything that was not technically feasible for those terminals. So IBM unwittingly became the bad computer."

Tap, Tap, Tapping

From what I've seen and heard, "Whiz Kids" appears to be the good guys versus the bad guys—television as usual, with the computers more or less incidental frippery. If toasters were the hot technology, we'd probably see a show about kids who solved mysteries by taking fingerprints off the chrome and divining information from English muffin crumbs.

That's a shame, because there are dozens of stories inside a machine such as the PC. How about a show where the sleuth solves users' mysteries? Peter Cunningham, known as PC to his clients, sneaks into the Boca Raton factory and uncovers all the interoffice memos on the bugs in PC BASIC. PC hears tell of a boy genius who can hook up the monochrome display to a graphics card—and searches the Himalayas to bring him back alive. PC helps a computer dealer who is kidnapped by a ring of competitors—for actually giving honest advice and decent service. The possibilities are endless.

A friend of mine posits the psychological theory that kids do whatever their parents find most irritating. Thus, in recent years, kids have taken to driving the rest of the world to distraction by barking "Nanonano," imitating a superannuated "greaser," talking in nasal Valspeak, and racing their cars like the maniacal Dukes of Hazzard.

So if CBS has guessed right, we can expect millions of fine upstanding American youngsters to buy slews of modems, dial remote systems, and tie up the phone system by attempting unauthorized entry into computers of all shapes and sizes. In a way Shirley Temple could never have imagined, the "Whiz Kids" will tap their way into our hearts. */PC*

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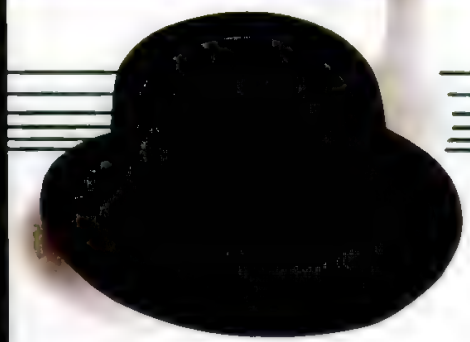
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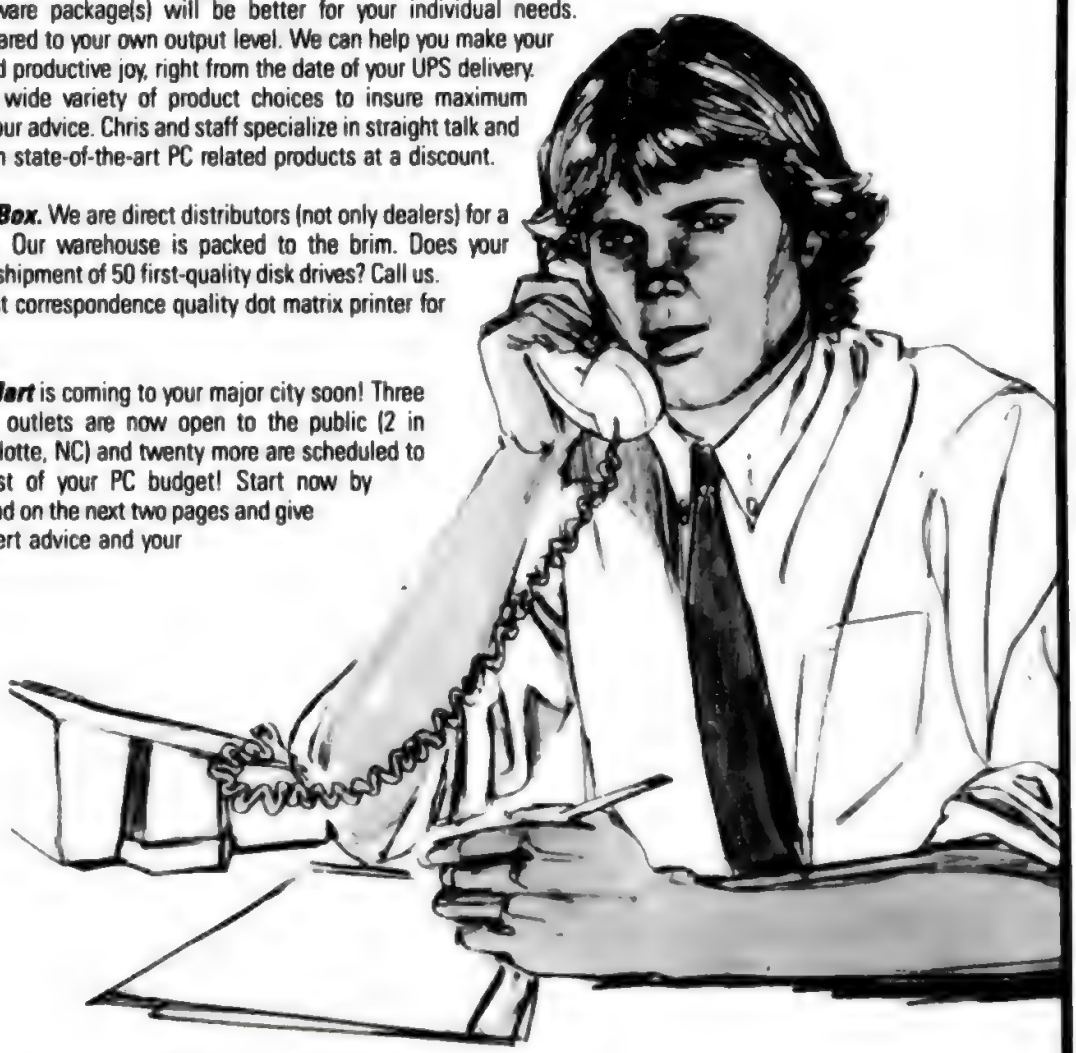
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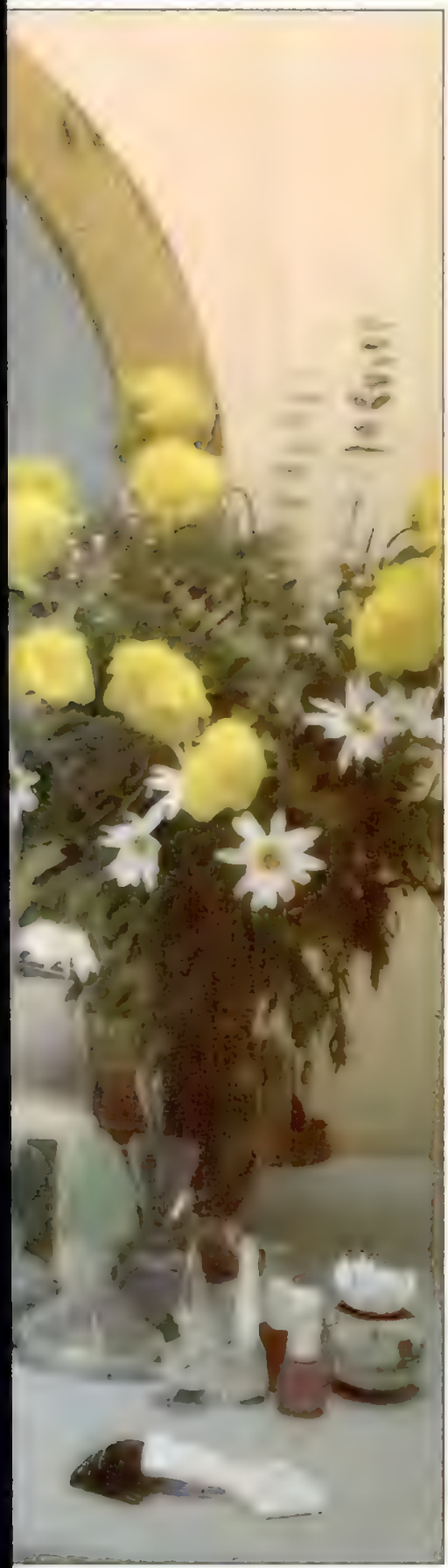
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While some search for true love, a certain wild and crazy element among the CompuServe set seek digital thrills in ModemLand.

COMPUSEX:

Reach Out And Touch Someone

Last spring, I bought a modem and began computing in the fast lane. In fact, it was so fast and racy that you could accurately describe my system's capability as downright 1200 bawdy.

It all began innocently enough when I strolled into my local Radio Shack and bought a membership in CompuServe, the information service that (for $5 an hour during nonprime time) can hook you up to more than 800 different databases—everything from the weather in East Africa to the latest price for gold futures. The service's most popular section, however, is its live, on-line "CB" simulation,

Photography by Dennis Bettencourt, hand colored by Alice Lager.

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in which crazed keyboard jockeys from coast to coast get together to argue, gossip, joke, philosophize, and make singles-bar small talk. There are bulletin boards around the country that offer similar real-time relating, but none are as huge or as geographically diverse as CompuServe.

It was CB that my two prepubescent daughters were itching to try. Within minutes after logging on, they were dragooned into private talk mode by a fellow who seemed delighted to be talking to CB'ers of the female persuasion. After a cursory chat about their careers (he was an electronics engineer; the girls described themselves as "students"), "Anthony" asked, "Are you ladies cute?" Than he asked about the length and color of their hair. The kids found this line of inquiry fascinating, and went on in detail about their shoulder-length blonde and chestnut tresses. From there the "conversation" went something like this:

HE: HAVE YOU BEEN INTRODUCED TO COMPUSEX YET?
THEY: No we haven't, but introduce us.
HE: JUST RESPOND WITH WHATEVER YOU FEEL LIKE.
(pause)
THEY: When does it start?
HE: I LOVE YOU DARLING <LONG FRENCH KISS>
(pause)
THEY: Phtoooey!
HE: <CARESSING YOUR HAIR>
THEY: I haven't washed it for ten weeks!
HE: <FONDLING YOUR BREASTS>
THEY: Get the hell off!
HE: DON'T LIKE IT, HUH?
THEY: Anthony, we have a confession to make. You happen to be talking to a twelve and nine year old kid! We just are very sophisticated because we come from New York.
(pause)
THEY: Hello? . . . Hello?

Poor Anthony's come-on brought a new dimension to the concept of "touch typing." But at the time, I assumed he was a lone CompuPervert, lookin' for love in all the wrong databases. In the weeks and months that followed, however, I learned that CompuSex—along with its less flashy but equally sought-after sibling, compu-friendship—is a staple out there in the global village. "Whoever would have thought," as one of my CB pals, Changeup, typed one night during a bemused discussion of the phenomenon, "that sexual technique would ever be dependent upon spelling!"

What's in a Name?

If you've never used CB, a little explaining is in order. When you first log onto CB, you're asked for your handle. (You can change yours at any time, simply by typing the command /han.) My own handle is Lynx, chosen because it's androgynous but slinky, and because it sounds like my real name—although I metamorphose into JournaLynx when I'm interviewing people, and into Lynx the Amazon when I'm spoiling for a fight.



POOR ANTHONY'S come-on brought a new dimension to the concept of "touch typing."

Handles can reflect the user's job, computer brand, home city, or favorite fantasy, and they're generally pretty creative. A few personal favorites of mine are Conan the Librarian and Baroness Von Slink. The regulars on CB tend to have handles they use all the time, so their friends can find them. People who are cruising on CompuSex are sometimes readily identifiable by their handles alone. On one recent weekend night, they included Funky Slut, Studley Hungwell, **NAKED**, Spanker, Programmed for Fun, HornyMale Wants Girl, Sex Maniac, Knockers, and a few too lascivious to be reprinted without overheating my circuit board.

Once logged on, you can use the status command (/sta) to find out how many CB'ers are on each of 36 channels. (Channel 1 is the official "adult" channel; Channel 33 is the unofficial channel for gay men; 17 is for kids 17 and under; and most of the rest are up for grabs. You can then type /tun to tune to the channel of your choice. If you want to find out who else is on CB, or on a particular channel, the user status command (/ustat) will bring you a scrolling list of each user's handle, the "nodes" they're calling from ("NYC" for New York; most of the rest resemble airport codes), their permanent CompuServe i.d. numbers, the channels they're currently tuned to, an asterisk indicating whether or not they're in private talk mode, and their "job numbers"—temporary numbers assigned by the system to everyone on CB. To go into private talk mode, you request to /talk and give the person's job number. Then you wait for the person to confirm with a command to /talk to you.

Once you know the commands, the trick is to think fast, type even faster, and learn to translate all your normal body language and emotions into the verbal domain of CB personality. If someone gets off a funny line, for example, you're supposed to type "hehehehe," or perhaps "<slapping thigh>." In other situations, you might <blush>, <sigh>, <snarl>, or even be seen <hanging head in shame>. On a good night, people pass around joints, which you're expected to share by <drawing deeply>.

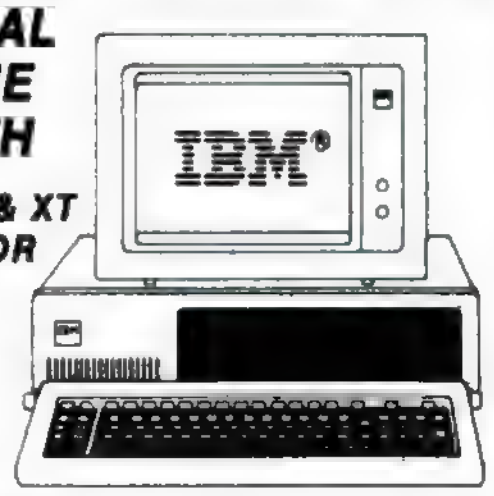
My friend Bluegrass was once a member of a CB gang. Actually, he only got to join the gang after becoming the first recorded mugging statistic on CompuServe. It all began one night when he was "lurking" (CB slang for eavesdropping without making one's presence known) on a bunch of people who were bemoaning their high CompuServe bills. Someone named Sweetcakes suggested robbing a bank, and began passing out black hats to

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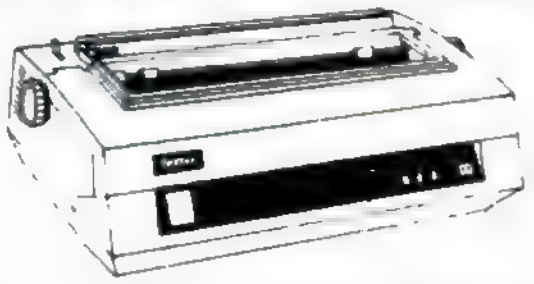
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CIRCLE 122 ON READER SERVICE CARD

the assemblage. Suddenly, Bluegrass blurted, "If I don't have a hat, does that mean I'm a victim?" Next thing he knew, he was ordered to put his hands up. They took his gold watch and his gold teeth, and decided not to kill him only after someone pointed out that if they let him live, they could rob him again the following week. When Saturday night rolled around again, the group decided that Bluegrass had been a pretty good sport, and they asked him to ride with them—albeit with a dusty rose hat. "The gang finally settled down on a raunchy little ranch off Channel 10, and we kept it going for about 8 months," Bluegrass recalls.

They were soon known as the Seedy Weed Funny Farm, and they were tough. "We used to hang CB wrong-doers regularly. Some flake-o would come on to the channel we were on and start making remarks we considered insulting, and Gunner would say, 'Hey, Blue, where's the rope?' Sweets would say, 'Didn't we smoke it last weekend?' and Cowboy would say, 'I thought of that—there's some fresh rope in the truck.' And while the flake-o would be saying, 'what the hell are you clowns talking about?' we'd be busily picking out a tree."

Beginnings

Most of us start our CB careers by lurking around on an open channel until we find someone to strike up a chat with. The CB equivalent of "What's your sign?" is "What are you using?"—which is to say, "What kind of computer do you have?" Reader, beware: If you happen to have an IBM, you'll be treated like a living Vuitton bag by the hordes of VIC-20 owners. More than once, I've been asked, "OH, ARE YOU RICH???" It's gotten to the point where I'm toying with the notion of saying I have a Cray. But there's also snobbery at the high end, particularly in the area of capital letters, the unmistakable sign that a person (a) has an el cheapo computer, or (b) is too technically wimpy to figure out how to change log-on defaults. The in computer, as far as I can gauge, is the slick Radio Shack Model 100, which combines high cost and affordability—a sort of digital T-Bird.

ONE OF the most popular people on CompuServe is a bright, warm, witty woman who can't speak and is confined to a wheelchair.

Actually, CB is like nothing so much as high school. There is an unabashed emotional intensity that manages to be simultaneously cliquish. For instance, it's traditional to send flamboyant <huggs> and <warm fuzzies> to greet your on-line buddies, like sophomores passing their friends in the stairwell between bells. There are popular folks and wallflowers, and the cultivation of a CB identity is serious business. The difference is that in real life, high school and beyond, we're routinely judged by our social categories: age, race, attractiveness, disability, gender, sexual preference, what we do for a living. On CB, none of these matter. There's a story currently making the rounds among the *compuscenti* about a famous science fiction writer who was introduced to CB at a computer show. Asked his handle, Famous Writer gave his real name and then spent a frustrating 20 minutes communicating with blasé CB'ers who assumed this was some sci-fi freak's idea of an interesting persona-for-a-day.

People start by communicating some essence of themselves. The social categories get filled in later, after rapport is already established. One of the most popular people on CompuServe is a bright, warm, witty woman who can't speak and is confined to a wheelchair. Still another is a woman who is both deaf and blind and uses a special Braille instrument to communicate. This ultra-democratic aspect is unquestionably one of CB's biggest charms, and—without putting too fine a socio-mystical point on it—one of the things that makes it seem like a quantum leap into some future world of digitized spirit. As Hyperher, a Los Angeles IBM owner, puts it: "I always had a fantasy about being made love to by someone who was blind . . . because I wanted someone to experience the me who I am inside, not what is apparent to the naked eye. This is as close as I'll get!"

Translated into the sexual venue, this means that you can turn yourself into Catherine Deneuve, even if you're not really beautiful (or even if you're not really female). You are what you type.

Thundar and Lightning

"Your true feelings come out when you're invisible," says Thundar, "and all your inhibitions fall away." Thundar is a 25-year-old programmer and Apple II+ owner from South Carolina. I "met" him recently when I set off on a series of on-line interviews with people about their CB relationships. Thundar is a hard-core CBer with a $400 a month habit, and he says his on-line friendships (most of which are nonsexual) are so intense that his off-line friends are jealous.

YOU ARE what you type.

When Thundar has CompuSex, he says it tends to be as much romantic as pornographic: He likes to tell his partners stories about knights doffing their suits of armor to bed fair damsels, and the people in his stories are always in love. Nor is he electronically promiscuous. "I don't think people on CB should attempt such things until they really get to know a person," he maintains. "CB can be used as a cheap thrill medium, but as in real life, I prefer a *real* relationship and not some quickie." Once, however, Thundar had a sobering experience. In the midst of a hot on-line session, his /talk partner suggested that she get off her modem and call him on the telephone, thus heating things up even more. Unfortunately, it didn't work out that way. "When we talked (voice line)," he reports. "the walls went back up."

A female CB'er also pointed out that CompuSex can lead to worse jealousy than the kind one encounters in real life, where lovers at least usually have the good grace to sneak around. "I used to see that asterisk next to the handle of the guy I'd had CompuSex with, and I *knew* he was doing it in /talk with another woman—and it really drove me crazy." Then there was the night someone called

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CIRCLE 187 ON READER SERVICE CARD

THUNDAR says his on-line friendships (most of which are nonsexual) are so intense that his off-line friends are jealous.

"Ready Female" went into /talk just long enough to ascertain each poor chap's predilection and then ran back to open channel to kiss 'n' tell. ("Hey, so-and-so is into whips!" etc.) Still, most people I interviewed were thrilled with their newfound compusexuality. As one Texas man noted with enthusiasm, "It's like having a dirty book that talks back to you." Several people pointed out that CompuSex relieves partners of worries about birth control or herpes. And a Corona owner from Georgia added that CB was one of the few places where he could meet and "date" women who "know that this is not a Funny Typewriter."

Meeting in Real Time

Some CB friends get together at organized parties, and many others eventually arrange to meet. Several marriages have even come out of CB, the most notorious of which actually took place earlier this year on-line, with the minister at one computer, the bride and groom at another, and dozens of assembled guests from all over the country. There was a lot of <wiping eyes>, and at the end, the throwing of CB-style rice: ! ! ! ! ! ! !.

But then there's Connie, a 35-year-old Florida woman, who is about to get the first CB divorce. Connie describes herself as someone who has "always had a great deal of difficulty meeting people. I never knew what to say and was afraid of appearing foolish." When Connie got interested in computers—she now owns three different Radio Shack models and a Texas Instruments—she profited professionally (getting promoted from bookkeeper to head of computer operations at her workplace, since she was the only person who understood computers) and also began to lose her paralyzing shyness. CB, she says, gave her the spontaneity of face-to-face contact, but with the freedom to edit and censor that actual conversation lacks.

Her first experience with CompuSex was completely unexpected; a man she was in /talk with asked her what she was wearing, and proceeded slowly to take all her clothes off. When Connie told her husband about this episode and a few others that followed, they decided to separate. "He now refers to 'my other lover'—the computer," according to Connie, and in fact, at this point in her life, she says she prefers CompuSex to the analog variety. "I will not talk CompuSex with anyone unless that person really appeals to me," she adds. Like Thundar, she uses the word "romantic" to describe what she likes most about CompuSex. "I think some people can't understand how it can be that way. Those people are missing something very special." Luckily for Connie, her current marital difficulties are being made easier to bear by the fact that she has a supportive friendship in her life—another CB'er named Blue Bomb. "I don't know what I would have done without him," she says.

Remaining Chaste

Personally, I'm still a CompuVirgin—but out of monogamy, not morality, not being the kind to make judgments about what people do behind the privacy of closed disk drive doors. I have, however, made some terrific compufriendships.

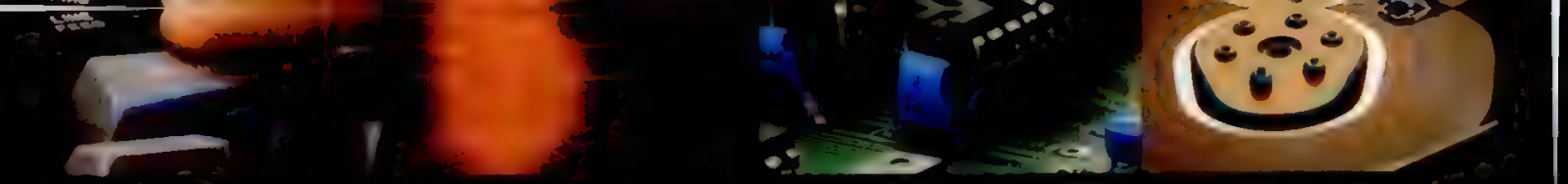
My best friend is Lady Editor (she's married to Bluegrass, who runs with the electronic posse), and I met her very early in my CB career—so early, in fact, that I couldn't understand why she ignored my request to /talk. "But I'm a lady writer!" I protested on the open channel. The next day Lady E. sent me a letter (via CompuServe electronic mail) saying that if I were really a lady writer—and not a male CompuSex Cruiser—she'd be glad to arrange a time to chat. Lady E. turned out to be a West Virginia newspaper editor with a passion for horses, chocolate, feminist politics, folk music, and telecommunications. We started to "talk" several times a week last May, mostly about computers and the newspaper business, but eventually about relationships, and about our childhoods. There's something about sitting in the green phosphor cocoon of one's computer at 3 a.m., laughing out loud, and knowing that someone else is doing the same thing 800 miles away, that makes one feel ridiculously intimate. Lady E. and I are both of the opinion that we would have become close friends if we'd met under some other circumstances—but part of what we have in common is our fascination with the medium in which we did meet, and our willingness to go with it. In fact, Lady E. and I now know each other so well that I've begun to refer to her in conversation the way I would about any friend—sometimes much to the bewilderment of my noncomputing, real-world friends.

My second best friend is Changeup, a San Francisco software editor, whom I originally met during a fight with someone whose handle (Stormtrooper) I took extreme political exception to. As I was donning my Lynx the Amazon leather-lady gear and practicing my <uppercut to the jaw>, Changeup suddenly appeared on the channel and stuck up for me, making old Stormy feel like he'd just lost the Normandy beaches. Changeup is very funny and articulate, and I recently tried to cajole him into having CompuSex with one of the Channel 1'ers so that I could interview him for this article. I even tried to help him think up irresistible handles, like "Surfer Stud" (Californians are absurdly popular on CB) or "For a Hot Time, Call Job # . . ." but he wouldn't listen. So far, he reports stumbling into a lot of terrific, meaningful friendships with women who are sick of compuharassment and want to talk to a nice guy for a change.

I'VE BEGUN to refer to Lady Editor in conversation the way I would a friend.

My 12-year-old, meanwhile, was unfazed by her experience at the hands of Anthony the compumolester and is now having regular dates with an 11-year-old boy from Long Island. On line, of course. /PC

PC contributing editor Lindsy Van Gelder is also a contributing editor to Ms. Magazine.



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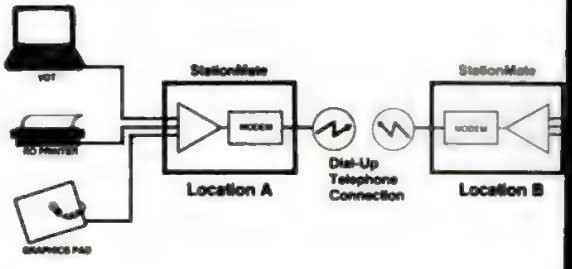
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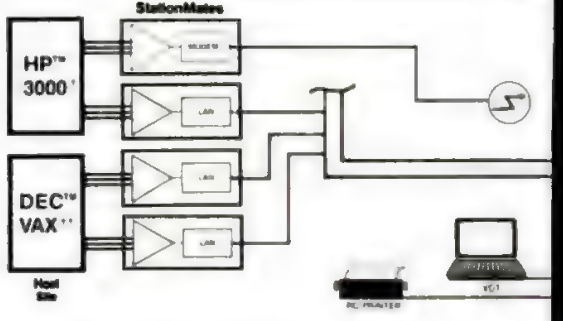
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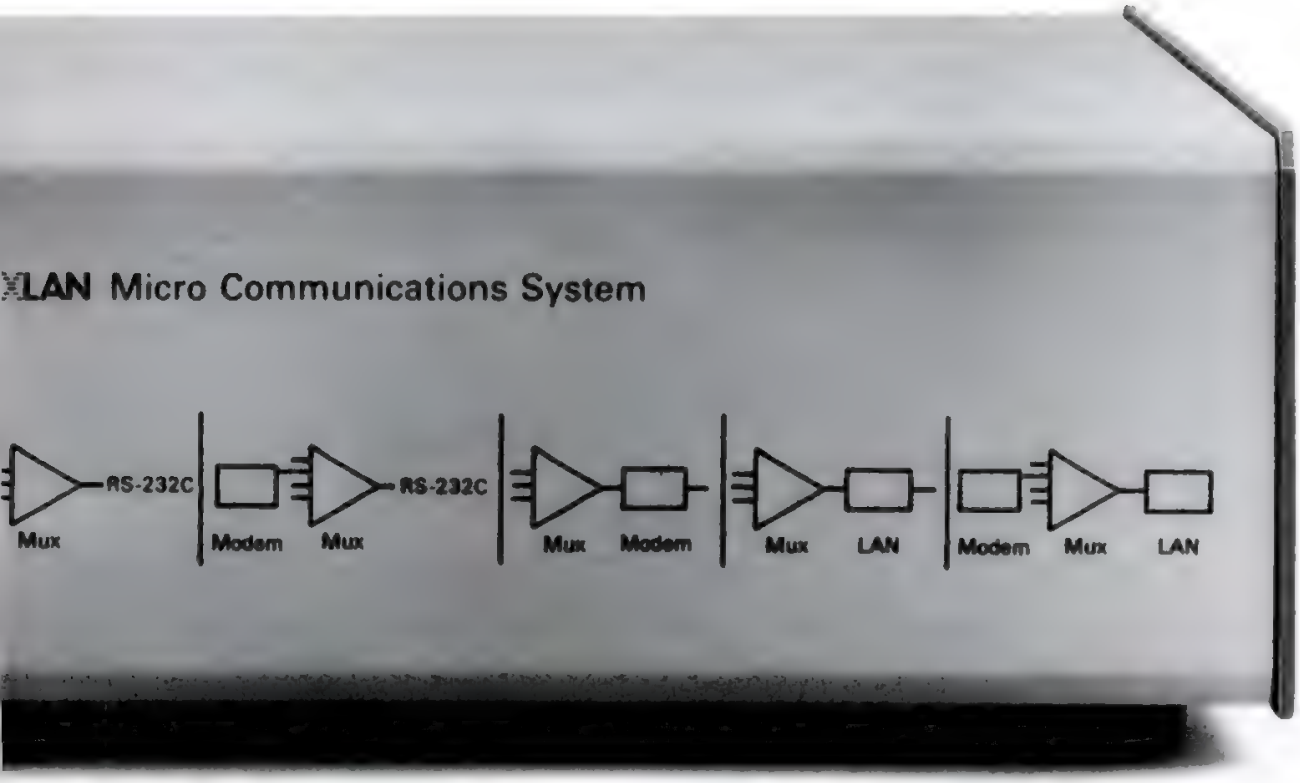
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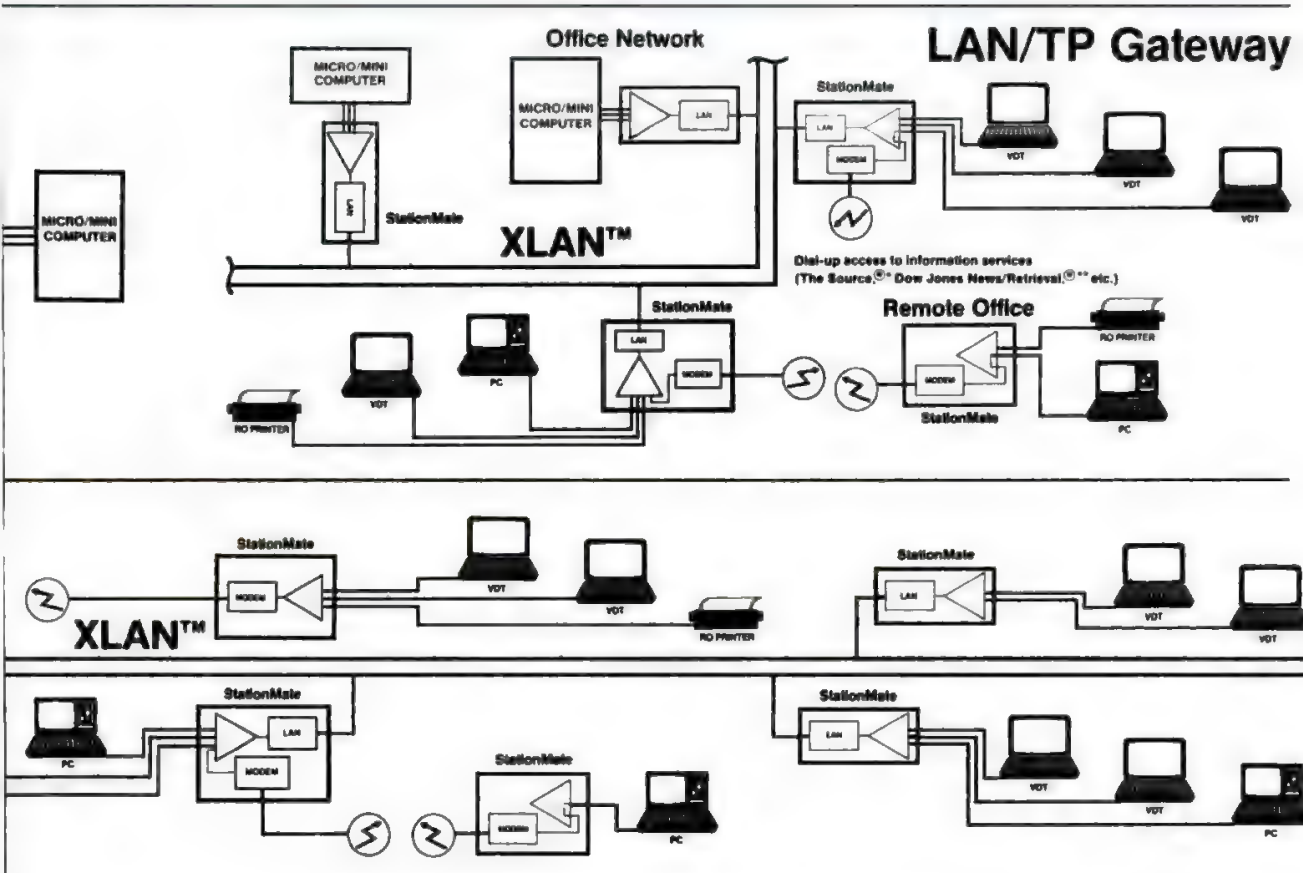




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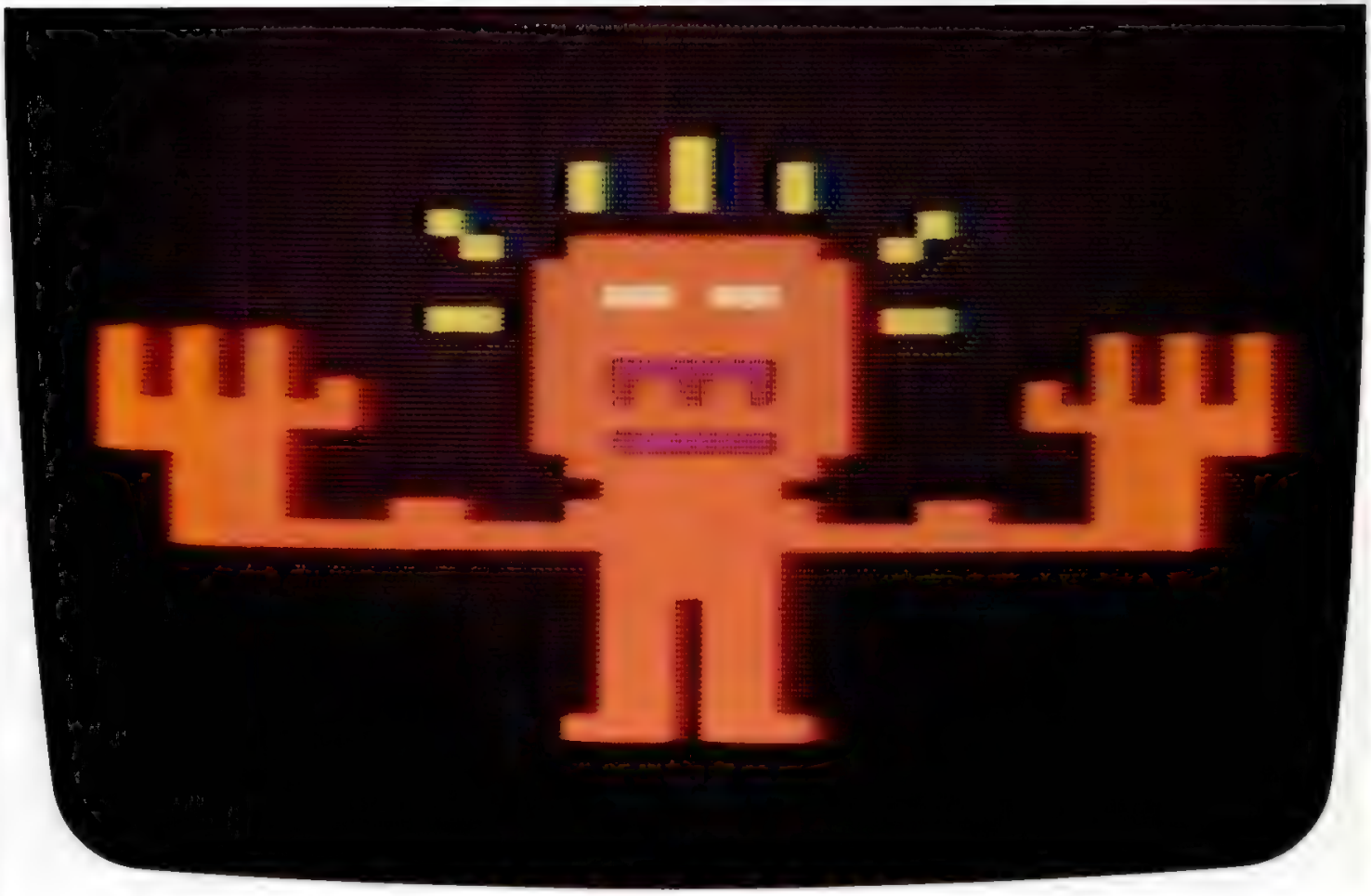
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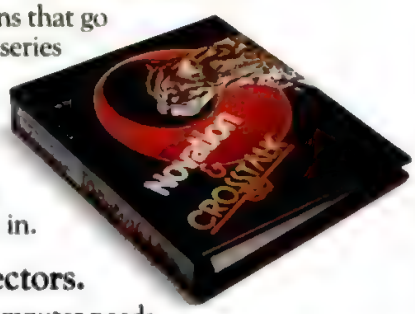
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BOOK EXCERPT/TED G. LEWIS

What is a Pascal program? What is "strong typed data"? And what are the differences between the two versions of Pascal offered by IBM?

Pascal For The IBM PC

Pascal Programming For The IBM Personal Computer
Ted G. Lewis
Addison-Wesley Publishing Co.
Reading, MA 01867
288 pages, $15.95 trade paperback
ISBN 0-201-05464-7

CIRCLE 539 ON READER SERVICE CARD

Excerpted from Pascal For The IBM Personal Computer *by Ted G. Lewis, copyright © 1983, by permission of Addison-Wesley Publishing Co., Reading, MA 01867. All rights reserved.*

This book is about Pascal programming on the IBM Personal Computer. In the chapters that follow, you will be gradually introduced to the power and flexibility of two Pascal dialects. The IBM Pascal dialect is an extension to the ISO (International Standards Organization) standard Pascal that emphasizes the "systems" features needed for machine level programming. You can think of these extensions as a kind of high-level assembler language.

The UCSD Pascal dialect is an extension to the ISO standard Pascal that emphasizes the needs of application level programming. You can do extended arithmetic, graphics, and screen editing kinds of programs with the UCSD Pascal dialect.

Unfortunately, this simple division between these two dialects is a gross oversimplification. Both languages are capable of systems programming, and with some assembly language routines, both are capable of application programming. To really understand the differences you will have to read the remaining chapters! But to get a quick overview, suppose we examine these two languages in the large.

IBM Pascal

IBM Pascal was developed by Microsoft, Inc. to be a highly efficient, optimized code translator. Considerable effort went into making programs run fast when compiled into machine language. One consequence of this is that three passes are made over your original source program in order to translate it into machine language.

IBM Pascal programs are translated into machine instructions that execute under the IBM DOS operating system. The result is a machine language program that can be combined with other machine language programs. Once translated, an IBM Pascal program cannot be distinguished from any other machine language program.

The IBM Pascal compiler not only requires three time-consuming passes over your source program, but it also requires 128K of main memory. You should keep this memory requirement in mind if you have not yet purchased a machine with 128K of memory.

An IBM Pascal object program (machine language version of your program) usually requires approximately 25K of run time support routines. A run time support routine is a subprogram that resides in memory while your program is running. It helps your program do input and output, arithmetic and so on.

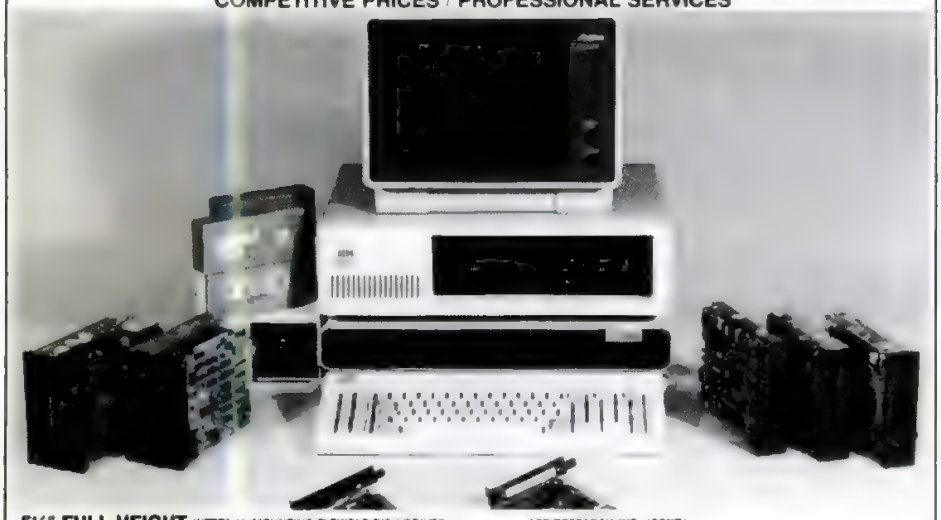
UCSD Pascal

UCSD Pascal was developed at the University of California at San Diego under the guidance of Dr. Kenneth Bowles. Later it was licensed to SofTech Microsystems for commercial distribution. The original version has evolved to

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version IV which runs on the IBM Personal Computer and many other microcomputers.

One of the strong features of the UCSD Pascal language is that it is part of a portable operating system called the p-system. The p-system includes a filer for managing disk files, an editor for composing programs, and translators for converting assembly language programs and FORTRAN programs, as well as UCSD Pascal programs into executable instructions.

Portability is obtained at a price, however, because programs in the p-system are translated into p-code, not machine language. A p-code program is a program containing hypothetical machine language instructions called p-code instructions. P-code instructions are much more compact than native machine language instructions, but they "execute" more slowly.

The p-system interprets p-code programs much like a BASIC interpreter directly executes BASIC instructions. The p-code interpreter simulates a p-code machine, and this is why it is sometimes called a p-code simulator. The p-code simulator is a machine language program.

The p-system runs UCSD Pascal programs much slower than they would run if they were translated into machine instructions. Thus, the price of portability is performance.

Version IV of the UCSD p-system includes a native code generator that can translate most p-code instructions into equivalent machine language instructions. The translation is not 100% complete, however, and so you must continue to run your programs under the p-system.

The advantage of native code translation, however, is that of increased speed. Much of the lost performance is regained (not all), but the resultant program is considerably larger. So, you must decide which is more important to you: size or performance. (You can selectively translate each subprogram into native code.)

P-code is slow but compact. One consequence of this is the fact that the entire p-system will execute on a 64K machine. Thus, only 64K of memory is required.

The compiler does its translation in one pass. This means you can expect fairly quick translations. Very little in the way of run time support is needed by your p-code program because they are built into the p-

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code simulator.

Portable p-code programs can be run on any microcomputer that has the p-system software. For the software developer, this means you can write your program once for the IBM Personal Computer and it will run on a number of other microcomputers, too.

System Requirements Compared

The table in Figure 1 summarizes the differences between UCSD and IBM Pascal system requirements. This is a very broad comparison, but it does tell you what kind of hardware you will need in either case.

The IBM dialect requires one diskette for each of three passes. Since the UCSD version is a single-pass compiler, it requires only one diskette. Both versions can run on a single diskette system (especially on double-sided drives), but it is not recommended.

Notice the difference in main memory requirements. The UCSD p-system is very compact, but your Pascal programs may be very large. Therefore, you may need 128K of main memory in either case. This memory difference should not be a consideration in choosing between one version of Pascal and the other. You will soon find that 128K is desirable for all but the most trivial programming.

Both dialects support the monochrome display and the color adapter. However, UCSD Pascal includes turtle graphics, which allows you to do color (and B&W) graphics. If you plan to do graphics at all, the UCSD Pascal language is the best choice.

Programs written for DOS can be easily transferred to other IBM Personal Computers running under control of DOS. However, programs written for the p-system can run on another computer under control of the p-system. (A licensing fee allows you to distribute the p-system with your programs.)

If you plan to do system level programming and you want machine language object programs as your final result, then the IBM Pascal system is probably your best choice. What you must remember is that you are trading portability for performance.

Pascal Language Features

Standard (ISO) Pascal is very similar to the original language invented by Niklaus Wirth. The goal of the original language was to help students learn "proper" programming skills, and to be easily implemented on a variety of computers. This goal has long since been forgotten in the rush towards modern structured programming languages.

Most "real-world" versions of Pascal go beyond the pedagogical standard. They attempt to do everything that a professional programmer wants of them. IBM Pascal and UCSD Pascal are no exceptions.

Figure 2 summarizes the overall features of these two dialects of Pascal.

BOTH languages support character strings as a built-in data type.

Both languages support character strings as a built-in data type. IBM Pascal actually supports two kinds of strings. An L-string can vary in length, whereas a simple string cannot. The UCSD string and the IBM L-string are very similar.

Both languages support string processing intrinsic functions. An "intrinsic function" is a built-in function. IBM Pascal is a little bit confusing, however, due to the L-string and simple string data types.

Graphics (turtle graphics) and sound reproduction are supported by a library of pretranslated routines in UCSD Pascal. You should use this language if you plan to program applications in music, games, or graphical design.

IBM Pascal does not directly support screen cursor control, but a machine language routine for this operation is included in this book. The UCSD language, on the other hand, includes the intrinsic function GOTOXY for cursor control.

Both languages support separately compiled subprograms. A "unit" is a cluster of procedures, functions, and data that can be separately compiled, stored on disk, and then "linked" into any other program. Units can be very useful when building large systems.

IBM Pascal modules are also separately compiled programs. They are similar to units.

UCSD Pascal provides a way for you to dynamically overlay pieces of a large program into memory. This means you can run programs that are too large to fit into

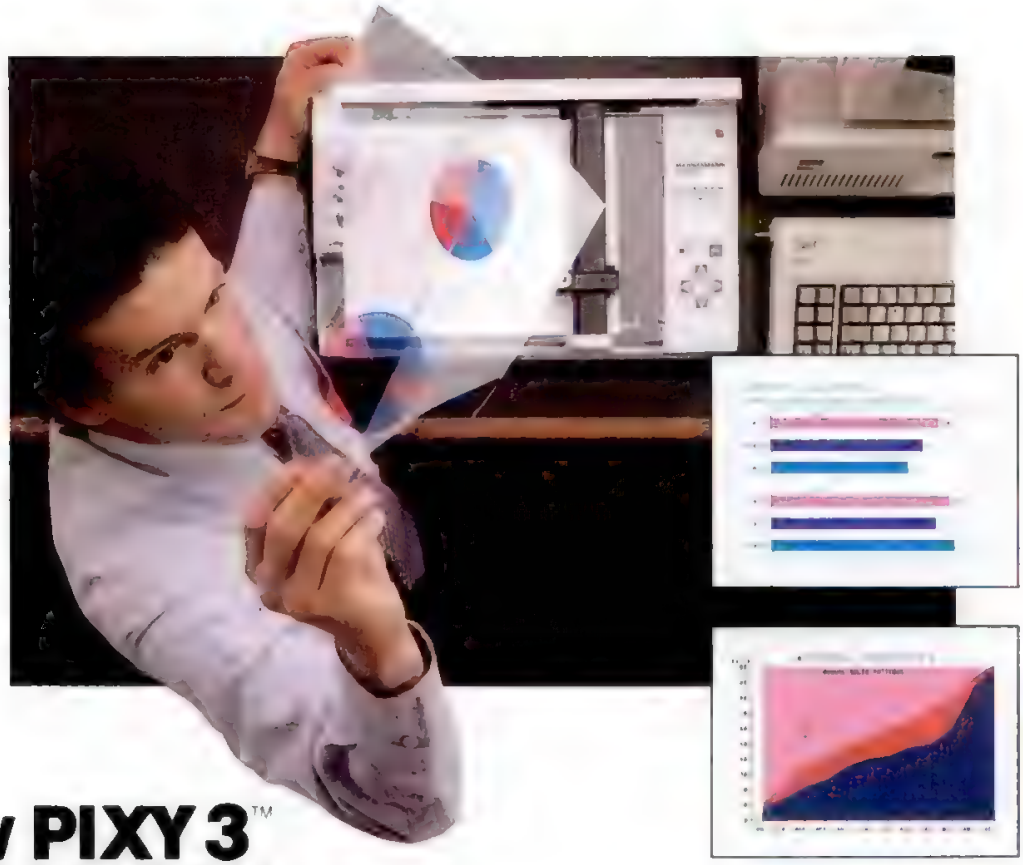
Figure 1: System Requirements

	IBM	UCSD
Diskettes to Compile	3	1
Manuals	1	2 (Language, only)
Memory required	128K	64K
Disk Drives recommended	2	2
Printer?	Up to 2	Up to 1
Display	B&W or Color	B&W or Color
Operating System	DOS	p-System

Figure 2: Language Features

	IBM	UCSD		IBM	UCSD
Strings	yes	yes	Systems programming	yes	no
Graphics	no	yes	Packed data	no	yes
Sound	no	yes	Initial values	yes	no
Units (separate compilation)	yes	yes	Structured constants	yes	no
			Control break	yes	yes
Modules (separate compilation)	yes	no	Control cycle	yes	no
			Case-otherwise	yes	no
Concurrent processes	no	yes	Procedures as actual parameters	yes	no
Program chaining	no	yes			
Direct files	yes	yes			

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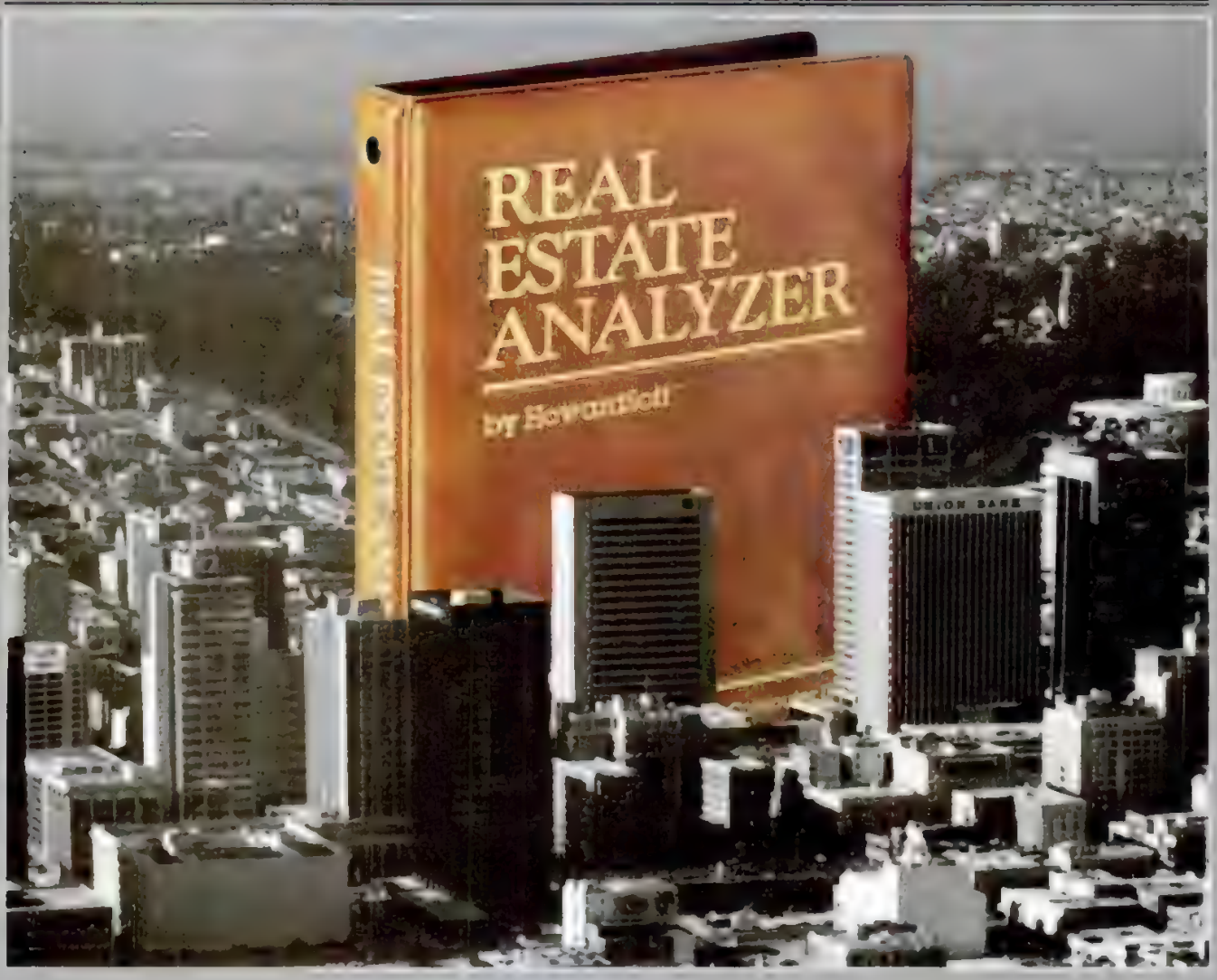
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memory in one piece. This feature may be an important one to consider if you plan to build very large programs. If so, then the UCSD Pascal language may be your only choice.

UCSD Pascal also provides concurrent processes. A "concurrent process" is a program that executes side-by-side with another program. For example, you might want to write a program that prints the contents of a file while another program does word processing (on another file, say). The print program is called a "spooler" and it executes in short bursts in between the times the word processing program is executing. Both programs execute in short bursts; first one and then the other. The spooler and the word processor programs are part of a system of (two) concurrent processes.

UCSD Pascal provides a way for you to write concurrent programs. In this sense, UCSD Pascal is a better language to use for systems programming than IBM Pascal. In fact, if you want to learn more about concurrency in computer systems, then use UCSD Pascal.

Both languages exceed the ISO standard for file processing. A "direct access file" is a file containing data that can be directly accessed in one "seek" to the disk. This is essential in most data processing applications.

IBM Pascal includes extensions to ISO Pascal for doing systems programming. In particular, IBM Pascal includes bit-level data types "byte" and "word" that let you access binary-encoded cells in memory. Other data types allow you to control the memory segmentation register of the 8088 processor and so forth. These features "break down" the strong typing of Pascal so that you can do mixed-type operations on memory.

UCSD Pascal allows you to compress your data into the smallest possible memory space. The "packed" attribute causes data to be "squeezed" into memory in the most efficient way possible. IBM Pascal, on the other hand, does not pack data. Remember, the goal of IBM Pascal is to be fast and efficient. If you want packed data, then you must pack it yourself using the system level data types.

UCSD Pascal provides an EXIT procedure that lets you break out of a procedure or program before reaching the end of the procedure or program. This is a kind of "early termination" intrinsic that comes in handy in structured programming.

If you are not used to programming without GOTO statements then the various forms of exits found in IBM Pascal will interest you. These are summarized below.

BREAK—leave a loop or decision path before it has completed the entire pass.

CYCLE—skip to the end of the loop and then start at the beginning of the loop continuing with the next iteration.

CASE-OTHERWISE—if all choices in a case statement fail, then do the OTHERWISE clause of the case statement.

UCSD PASCAL allows you to compress your data into the smallest possible memory space.

Language Limitations

Figure 3 summarizes some of the more important limitations of IBM Pascal and UCSD Pascal.

UCSD has a limited form of "long integer" that lets you process integers with up to 36 digits. IBM Pascal, on the other hand, provides "long integers" in the range of 0 to 65535. These are called "words."

UCSD Pascal runs on top of one or two optional simulators. The "SYSTEM4" simulator supports 16-digit precision real numbers. The "SYSTEM2" simulator and IBM Pascal language support 7-digit real numbers.

IBM Pascal L-strings can be up to 255 characters in length. The fixed-length strings can hold up to 32,767 characters. The maximum size of records, sets, and enumerated scalars is not defined in the IBM Pascal language.

You can use identifiers of nearly any length (as long as they fit on a line) in either language. The first 8 characters are the only ones that UCSD Pascal looks at, while the first 31 characters must be

unique in the IBM Pascal language.

The underscore character is allowed in both languages, but it is ignored in the UCSD Pascal System. For example, REC__NUM is treated like RECNUM by UCSD Pascal.

There are other limits unique to each language that you will encounter as you learn more about Pascal programming for the IBM Personal Computer.

In general, if you are concerned with speed of execution, systems-level programming, and portability is not especially important, then the IBM Pascal language is probably your choice.

If, on the other hand, you want portability, ease of use, graphics or sound, and you are not concerned so much with speed of execution or getting to the bits in main memory, then UCSD Pascal is probably a good choice for you.

This book will present examples of both programming languages. The parts of the languages that differ significantly will be treated in separate sections of the same chapter. This way you can pick and choose which dialect you want.

What Is a Pascal Program?

A "source program" is a collection of data descriptions and executable instructions written in a "form" that the Pascal compiler can translate into machine language. In this chapter we will learn the rules of acceptable "form" that the Pascal compiler expects you to follow. As you may know, this is called the "syntax" of Pascal.

It is also important for you to know what a Pascal statement means. In other words, you should learn the "semantics" as well as syntax of the following rules. The semantics of Pascal will be shown through numerous examples taken from actual Pascal programs.

A Pascal program is a "program heading" followed by a semicolon, followed by a "block," and terminated by a period. The simplest Pascal program that you can write is shown below.

```
program EXAMPLE;
  begin
  end.
```

The Program Heading

Note that the first line contains the "program heading." It consists of the "reserved keyword," *program*, followed by an "identifier" that is chosen by you. In the example, the "program heading" contains the word *EXAMPLE* as the name of the program. This name must begin with a letter of the alphabet, contain either letters, numerals, or the underscore character, and consist of 31 or fewer characters (all characters beyond the first 31 characters in a name are ignored).

The reserved keyword, *program*, is one of many keywords that are used by the Pascal compiler and so cannot be used as a name by you. Consult Figure 4 for a complete list of the reserved words in Pascal, and Figure 5 for a list of other words that are used by the IBM Pascal compiler. To be safe and sure, use words other than the ones in Figures 4 and 5 as names in your programs.

You can translate *EXAMPLE*, in the above program, into machine language that will run on your IBM Personal Computer. Use the steps explained earlier to do this. Of course the resulting machine language program is not very interesting because it has no inputs, outputs, or instructions that do anything! But the program is entirely correct.

KEYWORDS that are used by the Pascal compiler cannot be used as a name by you.

Notice the semicolon that follows the "program heading," and the period that follows the program "block." These are two very important punctuation marks in every Pascal program.

The semicolon character is the statement separator in Pascal. It is used to concatenate two or more statements. Concatenation means "to join together", and this is exactly what the semicolon character does in Pascal. You will use semicolons in many places in a Pascal program, but they always mean the same thing: cocatenate two statement parts.

In this case we have used the semicolon to concatenate the "program heading" with the program "block." The "block" is sometimes called the program "body,"

Figure 3: Language Limits

	IBM	UCSD
Max integers	-32,767..32,767	-32,767..32,767
integer	-32,767..32,767	-32,767..32,767
word	0..65535	
long		up to 36 digits
Max reals	7 digits to E ± 38	16 digits to E ± 308
String lengths	0..255 and 1..32767 characters	1..255 characters
Array size	1..32,766 bytes	1..32,766 bytes
Set size	?	1..4080 elements
Identifiers	recognize up to 31 characters	recognize up to 8 characters

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because this is where the instructions to be carried out belong.

The Program Body

The *begin-end* pair in the sample program above encloses Pascal statements that perform actions when your program is run. This is where the "executable part" of your program goes. Input, output, addition, subtraction, comparing values, and all actions performed by your program are placed in a certain order here.

NAMES OF constants can be up to 31 characters in length, just like the names of programs.

The "block" of a program actually contains a data section and an executable part section. The *begin-end* pair enclose the executable part, but other Pascal statements may optionally appear in the "block" before the *begin-end* pair. These other statements define the data that is to be processed by the *begin-end* part. Here is another example, showing a data part.

```
program SAMPLE;
   const A = 5;
         B = -10;
   begin
   end.
```

In this example, *SAMPLE* is a program that contains two numbers, *A* and *B*, and nothing else (not even an executable instruction). The numbers are given names (*A* and *B*), and values (*5* and *−10*). Furthermore, the reserved keyword, *const*, is used to declare *A* and *B* as "constants". A program "constant" in any positive or negative number, or string of characters that never change during the life of the program. That is, *A* is always *5* and *B* is always *−10* in *SAMPLE*.

Constants are given names in the const statement. Names of constants can be up to 31 characters in length, just like the names of programs. The first character must be a letter of the alphabet, and the subsequent characters must be either letters, numerals, or the underscore character. Here are some constants.

```
A12
END-OF-THE-MONTH
```

Here are some *incorrect* names that you should *not* use.

```
$BILLS
BILL$
N%
```

These are incorrect because $ and % are not letters of the alphabet, numerals, nor an underscore.

Simple Output

Obviously, the previous two examples are of little use because they contain *null begin-end* executable parts. What is needed is a way to get information in and out of a program, and process the information in between.

Figure 5 lists words that are used by Pascal to do certain common things. Input and Output are among those words, because every useful program frequently requires them.

In order to do output from your program to the screen of your Personal Computer, you must use the predeclared word *output* in the program heading, and then use predeclared "intrinsic procedures" *write* and *writeln*. Here is an example that you can run on your Personal Computer.

```
program SCREEN (output);
   begin
      writeln ('Test program
      SCREEN);
      write ('A one-line prompt');
      writeln
   end.
```

This program has many interesting features to discuss. Suppose we begin with the program heading and work our way through it one statement line at a time.

```
program SCREEN (output);
```

The program is given the name *SCREEN* by the author and since it is going to display some information on the screen, the predeclared word *output* is included in the program heading. The word *output* is enclosed in parenthesis beause the syntax rules of Pascal require parenthesis to separate the name *SCREEN* from the name *output*.

The program heading still requires a semicolon between it and the program block. This tells the translator to expect a block to follow the heading. Remember that the semicolon means to join together or concatenate two parts of a program.

```
   begin
```

This program has no data! It simply outputs two messages and then it stops (we say it "terminates execution"). However, the syntax rules of Pascal require that all executable statements be enclosed inside a *begin-end* pair.

```
      Writeln ('Test program SCREEN');
```

This is an example of a Pascal "intrinsic procedure." Here *writeln* is the name of a built-in program that is provided by Pascal to perform the task of displaying a line of information on the *output* screen. The purpose of *writeln* is to display the values listed between the parenthesis that follow *writeln*.

When program *SCREEN* is translated and then run, it "calls" the intrinsic procedure *writeln*. In turn, *writeln* displays the message given in parenthesis:

```
Test program SCREEN
```

Note how we instructed writeln to display this information. The single quote marks are used in Pascal to denote a "string constant". A string constant is a string of characters.

The string constant is displayed on the screen at the current screen cursor position. Thus, "Test program SCREEN" will appear on the screen wherever the screen cursor happens to be when the program is run. After the message is displayed, the cursor is moved to the next line following the message. The way in which the screen cursor is moved to the next line is very important, and you should pay careful attention to the difference between *writeln* and *write* as illustrated in the next statement line.

```
      write ('A one-line prompt');
```

Notice the semicolon following the previos statement line and this statement line. The semicolon means to "join together," hence the two output statements are concatenated.

This is an example of another intrinsic procedure that outputs the message:

```
A one-line prompt
```

This message is output on the line immediately below the previous message. The two statements cause the screen to contain

Figure 4: IBM Pascal Reserved Words

Standard Pascal	if	to	implementation
and	in	type	interface
array	label	until	module
begin	mod	var	otherwise
case	nil	while	public
const	not	with	pure
div	of		readonly
do	or	**IBM Pascal**	return
downto	packed	adr	static
else	procedure	ads	super
end	program	break	unit
file	record	cycle	uses
for	repeat	enter	value
function	set	external	vars
goto	then	forward	xor

Figure 5: IBM Pascal Pre-Defined Identifiers

These names may be re-defined by the programmer, but once they are re-defined, they no longer have the meaning given by the IBM Pascal system.

Standard Pascal	rewrite	**IBM Strings**	**IBM I/O**
arctan	round	concat	assign
abs	sin	copylst	close
boolean	sqr	copystr	discard
char	sqrt	delete	filemodes
chr	succ	insert	readfn
cos	text	positn	readset
dispose	true	scaneq	sequential
eol	trunc	scanne	terminal
eoln	unpack		
exp	write		
false	writeln	**IBM System**	**IBM Miscellaneous**
float		fillc	FCBFQQ
get	**IBM Pascal**	fillsc	maxword
input	abort	movel	word
integer	byword	mover	wrd
ln	decode	movesr	lstring
maxint	encode	movesl	null
new	eval	retype	string
odd	hibyte		{}
ord	lobyte		(**)
output	lower		!
pack	result		
pred	sizeof		
put	upper		
read			
readln			
real			
reset			



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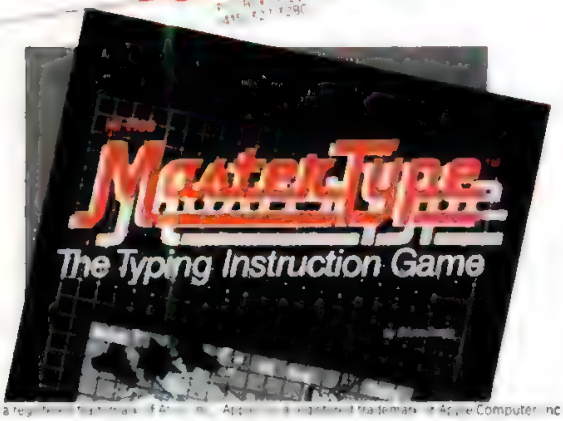
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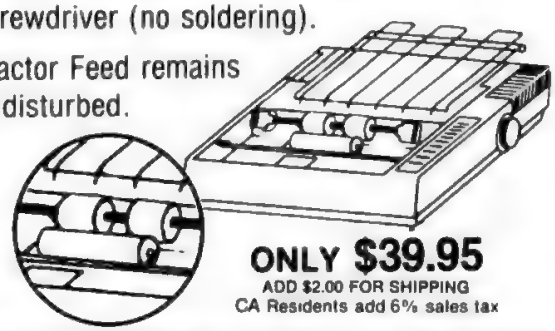
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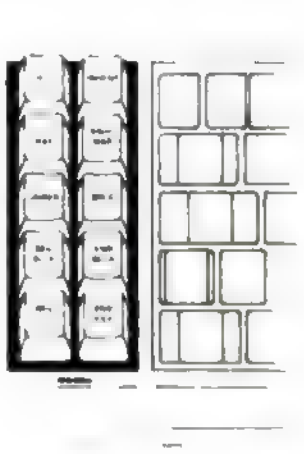
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the following two messages.

```
Test program SCREEN
A one-line prompt
```

However, there is a subtle difference between *writeln* and *write*. The difference is that *writeln* causes the cursor to move to the next line, while *write* does not. To force the cursor to move to the next line of output, we must include the next statement in program *SCREEN*.

```
writeln
```

This is the *writeln* intrinsic procedure again. Only, this time it has no list of values to display. Hence, this statement simply causes the screen cursor to go to the next line. A *write* followed by (concatenated to) a null *writeln* has the same effect as a *writeln*. Therefore, we could have eliminated the two lines:

```
write ('A one-line prompt');
writeln
```

and in their place we could have put:

```
writeln ('A one-line prompt')
```

However, there are many places where we do not want to move the cursor to the next display screen line after a message is displayed. In such cases we must use the *write* instead of the *writeln* intrinsic procedure.

A further note on the statement line containing *writeln* is needed. Notice that there is an absence of a semicolon following *writeln*. This is not a typo or error. The semicolon means to concatenate two statements. They are a reserved keyword followed by a period to punctuate the end of the program. It is not necessary (although it is permitted) to use a semicolon to concatenate a reserved keyword to a statement. Therefore, no semicolon appears following *writeln*.

```
end.
```

This ends the executable part of the program. All of the statements enclosed between the opening *begin* and the closing *end* are translated into actions to be carried out by the computer. The actions included in sample program *SCREEN* are defined by built-in programs called *write* and *writeln* (pronounced "write line").

The period is used to terminate source program text. The period tells the Pascal translator, "that's all folks." Be careful to not use the period following the keyword anywhere else but after the absolute end of the program, or as part of a real number (e.g. 7.5).

BEFORE YOU CAN write exciting Pascal programs, you must be able to input and store values in memory somewhere.

Data Types?

You have seen an example of a program with simple constants A and B, and another example with simple output. But before you can write exciting Pascal programs, you must be able to input values (data) and store these values in memory somewhere. To do this, you must first understand the concept of a program storage "variable."

Program Variables and Types

A program "variable" is declared by putting its name in a *var* statement. A variable has a "name," "value," and a "type" in Pasal. The name is any identifier (up to 31 characters beginning with a letter, and including letters, numerals, and underscore.) Here are some names of variables.

```
MY_COUNT
INTEREST
M16
```

Names cannot have imbedded special characters like $ and %. Therefore, these are incorrect names of variables.

```
$COST
BILL$
MONEY%
UP_$ET
```

A "value" is any self-defining symbol in Pasal. Thus, 5 is a self-defining symbol meaning five "things." The character string *Test program* is a self-defining symbol(s) meaning a string of characters made up of T, e, s, t, , p, r, o, g, r, a, and m.

A "simple type" is a collection of values. The collection of integers is a type called "integer" in Pascal. The collection of keyboard characters is a type called "char," and so forth.

A "*strong type*" is a collection of values plus the collection of basic operations that are allowed to be performed on the collection of values. Pascal is a "strongly typed" language, because the variables in a Pascal program are assigned a "*strong type*."

In Pascal there are four "base types:" boolean, integer, char, real.

The collection of values that make up "boolean" are TRUE and FALSE. The allowed operations on boolean variables and constants are various comparisons like "greater than," "equal to," and others that will be discussed as we learn more about Pascal.

The collection of values that make up "integer" are the integers from −32767 to +32767. (These are all of the whole numbers that can be stored in a 16-bit-wide word.)

The collection of operations that are allowed to be performed on integers includes such things as addition, subtraction, integer divide without a remainder, modulus (without the quotient), assignment, etc.

The collection of values that make up "char" are the letters of the alphabet, special character, the space, and the numerals 0 through 9. You can perform comparisons, assignment, and various conversion operations on "char" variables and constants as shown later.

The collection of values that make up "real" are all numbers containing a decimal point in the range of ±1.7E±38 (approximately). Real numbers provide about seven digits of precision with the largest number approximately:

```
1.70141200 E 38
```

In Pascal, a real number must be written as a number with a decimal point (period) and at least one leading and one trailing digit. Here are some examples.

```
1.5
0.3
1.0
0.1 E 2 (same as 10.0)
```

Here are some incorrect counterexamples. These are not correct because they either exceed the size allowed or they do not contain at least one digit on either side of

the decimal point.

```
1.
.5
1.5 E 40
```

The allowed operations on real variables and constants are the usual arithmetic operations, assignments, etc. We will examine these operations in greater detail when the need arises.

Ordinal versus Infinite Types

One of the unusual things about Pascal is the way it treats "countable" types as opposed to "uncountable" types. The base types boolean, integer, and char are countable, while the base type real is not. In fact, there are 2 values in the type boolean, 2^{16} values in type integer, and 256 in the type char (on the IBM computer you can use all 256 extended ASCII codes). But we do not know how to count all of the real numbers in mathematics, so we call these the uncountable or infinite numbers. Thus, in Pascal, "real" stands apart as an infinite type. This will cause some exceptions in Pascal, as you will see.

We can divide the base types into two groups. In the first group, called "ordinals," the values can be counted. In the second group, called "non-ordinals," the values cannot be counted because there are an infinite number of possible values.

YOU MIGHT think of a type as a kind of unit of measurement.

The VAR Statement

A variable is assigned a name and a type by placing it in a "var" statement. In fact, we must define the name and type of all variables that are used in a program by listing them in a single "var" statement.

```
var
   x : real ;
```

The keyword *var* is followed by the name of the variable, followed by a colon, followed by the type. This declaration is going to be either concatenated to another definition or the remainder of the program, so a semicolon is used after the type.

Here, x is a variable that can take on real values, only. Furthermore, since x is real, only the operations defined for real values will be allowed to be performed on x.

```
var
   x, y, z : real;
```

Here we have used commas to separate the names of a list of variables. This shows how you can declare x, y, and z as real-valued variables in a single line of Pascal. You could also have used three separate lines and the results would have been the same as shown below.

```
var
   x : real ;
   y : real ;
   z : real ;
```

There can only be one *var* in a program. Therefore, you must use either the commas or the multiple lines as shown above. The following is not allowed.

```
var
   x : real ;
var
   y : real ;
var
   z : real ;
```

You can put multiple names and multiple lists of types in a single *var* statement as the following example illustrates.

```
var
   x, y, z : real ;
   m, n : integer ;
   bit : boolean ;
```

Notice that the *var* and *const* statements define the names of all data in a program. Therefore, the *var* and *const* statements control how the memory is used to hold data, whereas the *begin-end* pair enclose and define the memory region containing instructions.

The difference between a const name and a var name is simply this: a const never changes its value, but a var may. Therefore, the value stored in a named constant never changes. The value stored in a var name may be changed by merely storing some new value over the previous value.

The Notion of Type, Revisited

The first time you encounter the notion of a data type in a strongly typed language like Pascal, you probably think it is an unnecessary bother. So why is it useful to force a type on every piece of data stored in a program?

You might think of a type as a kind of unit of measurement. Suppose, for example, we define FT as a variable that can hold so many feet, and IN as another variable that can hold inches. For example, we can let FT be 10 feet and IN be 5 inches. Now, suppose we want to add these two values together. That is, we want to add: FT + IN. We say that these two are incompatible because they have different units of measurement.

WHY IS IT useful to force a type on every piece of data stored in a program?

We must change FT and IN into the same types (units of measurement) before we can add them together, meaningfully. Suppose we change FT to inches and then add: 120 + 5. The result, 125, is in inches.

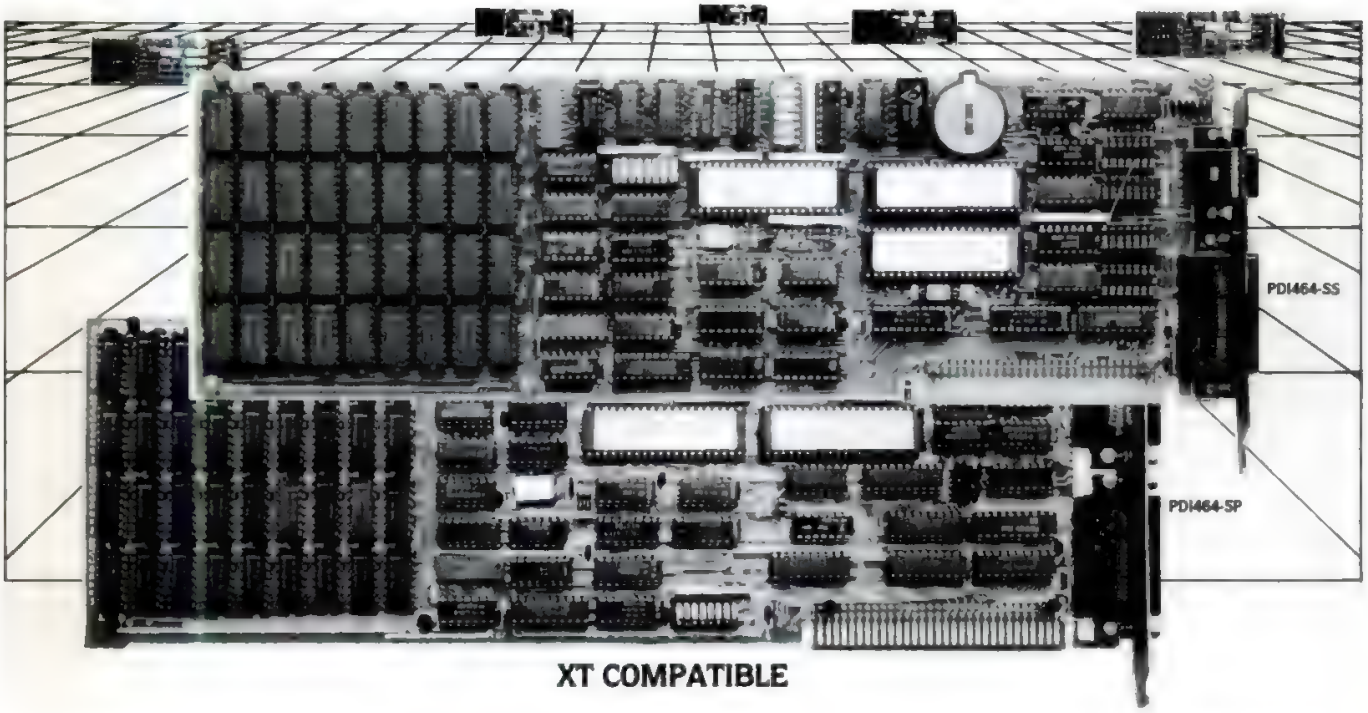
In Pascal we say *FT + IN* is a "mixed type expression," because the variables do not have the same base type. The rules for changing the types of variables and constants must be followed closely or else your Pascal program cannot be translated into correct machine language.

You may still wonder why strong typing is useful. In fact, strong typing is an obstacle to be overcome in many situations. So why use it? The answer is in the area of program correctness. In a strongly typed language it is easier to write correct programs because the translator can catch many of the errors like the one found in the mixed type example above.

A large, complex program may have errors in it due to incorrect use of its variables. The translator can help you catch these errors by checking for mixed type expressions, and either warning you, or in many cases, stopping you altogether. */PC*

Ted G. Lewis is an instructor at Oregon State University in Corvallis.

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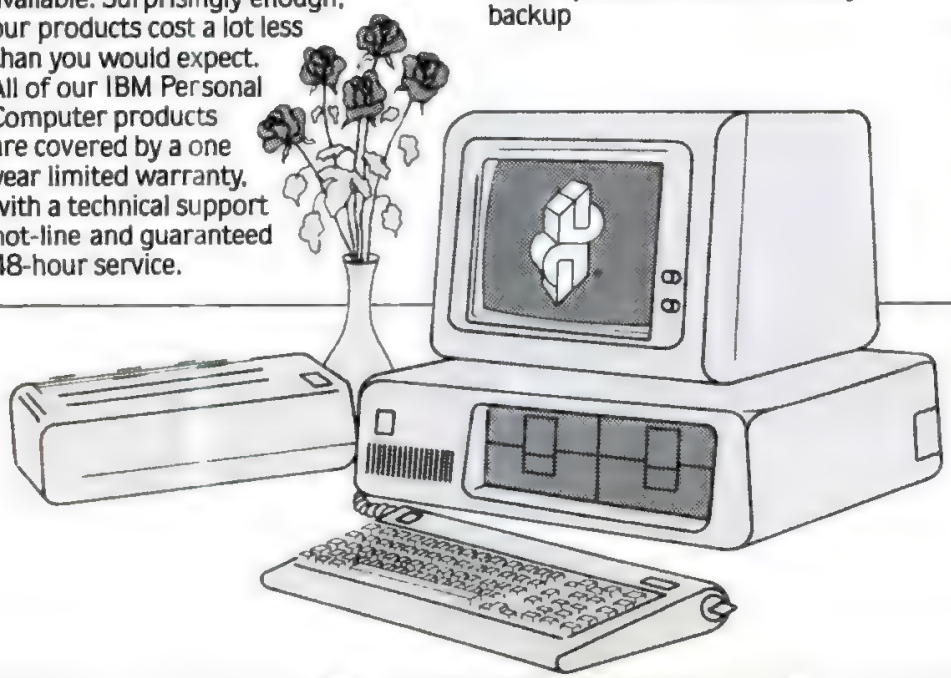
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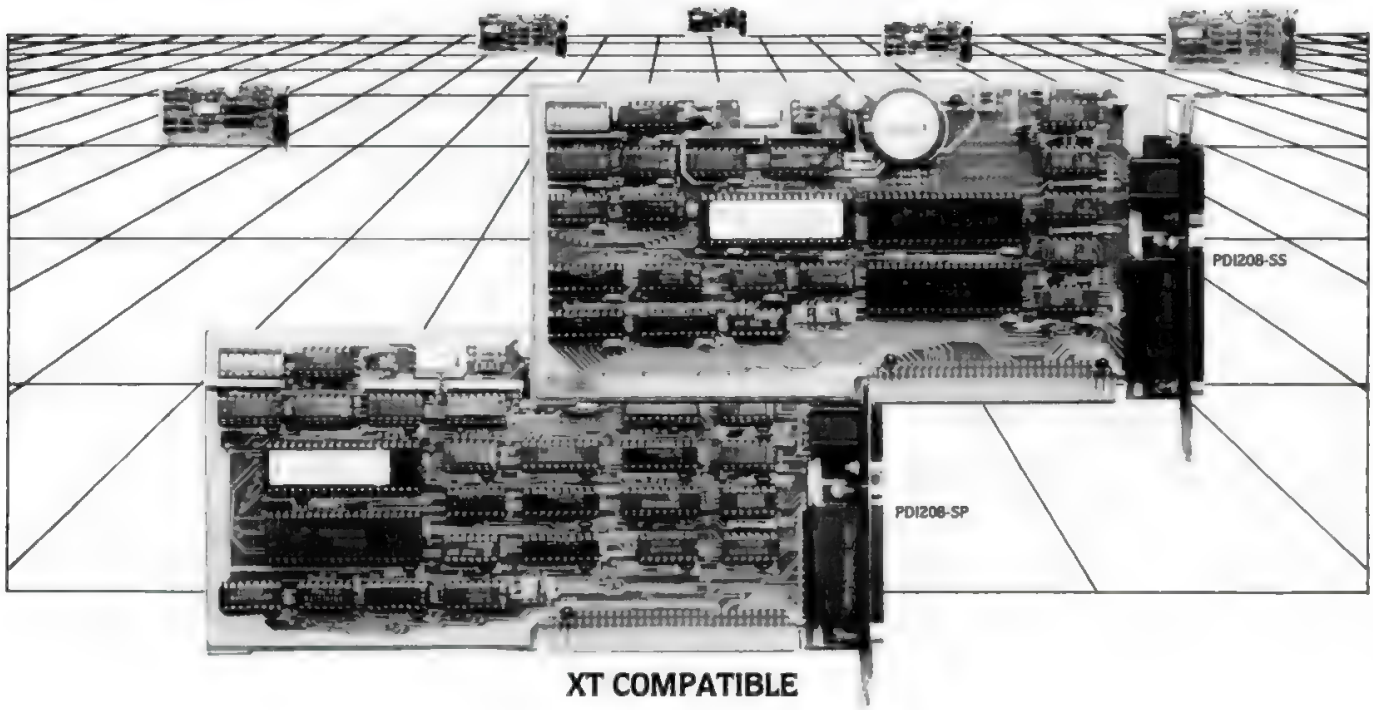
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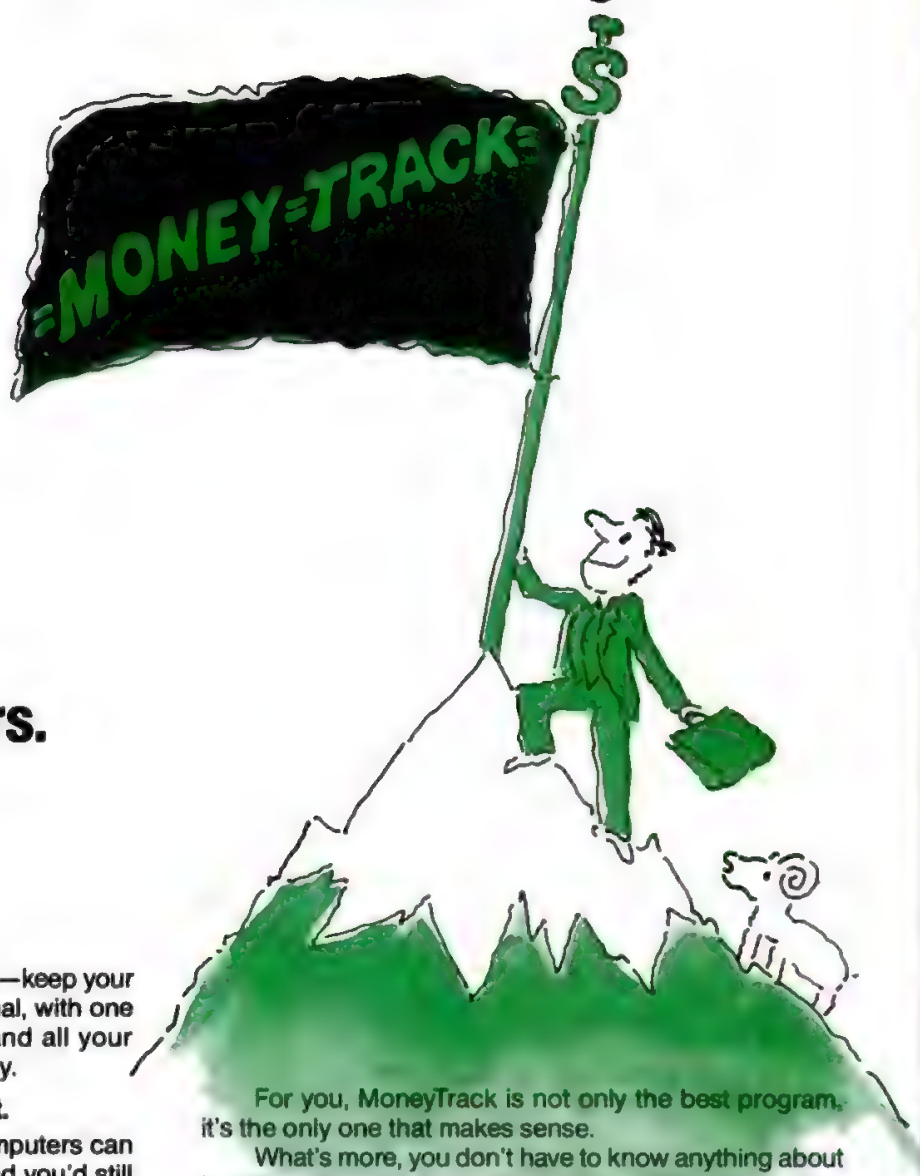
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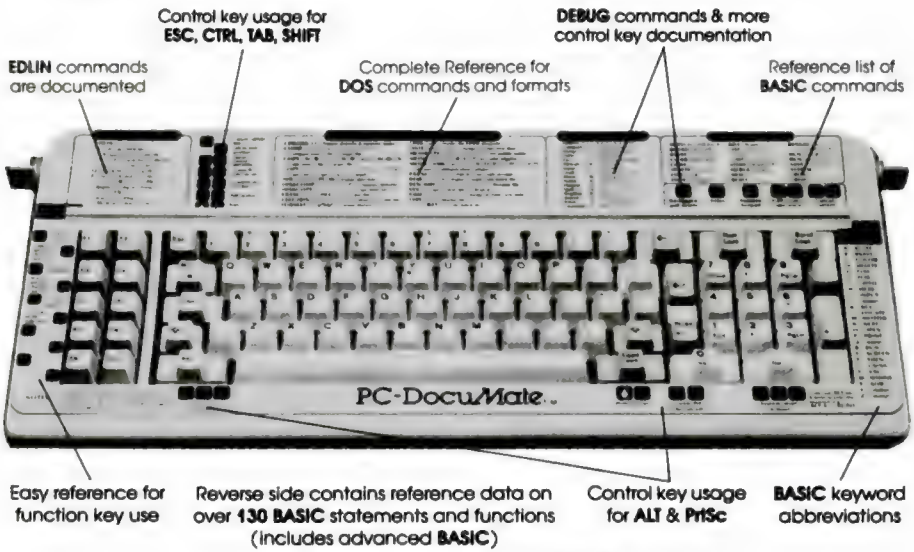
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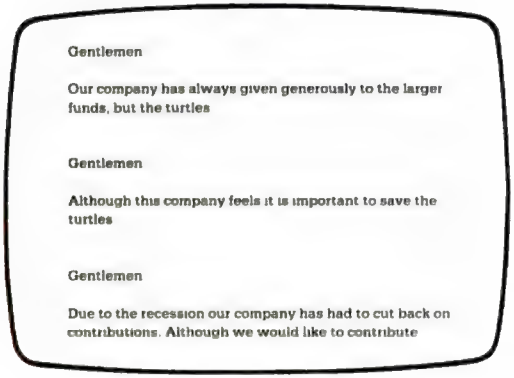
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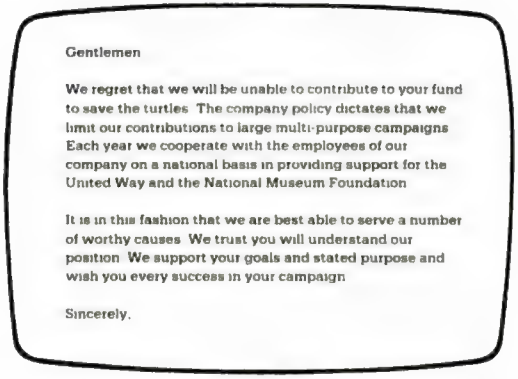
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PC 11 83



A Hollywood vice unit has come to rely on a PC-XT to help keep track of "professional" offenders. Its success could pave the way for extending XT's reach into other areas of law enforcement.

Just The Facts, RAM

Her AKAs filled the computer screen—Cynthia Williams, also known as Candy Adams, Carrie White, Cindy Walters, Doreen Hill. On the street, she was 20 different people to any number of different johns. To the police, she was a familiar face, one of thousands of prostitutes with long strings of assumed names that marched across this CRT display like an army of phosphor spiders. Scanning the monitor, I noticed, however, that this woman had one stand-out, identifying mark: deceased.

I was sitting at the desk of the toughest record keeper in the city of Los Angeles—the PC-XT at the Prostitution Enforcement Detail of the Los Angeles Police Department's Hollywood Division. The XT sat silently bathed in the fishbelly-white fluorescent light of the division offices. Cops, costumed in Bermuda shorts and Hawaiian-print shirts, strolled in and out of the little computer room. This evening a prostitution task force would sweep the streets, and they were dressed to bait the ladies.

PC Joins the Force

The strange tale of the PC-XT that keeps track of the "professionals" had begun about a year earlier, when the Hollywood Chamber of Commerce solicited funds from the private sector to purchase a PC-XT and a printer. The LAPD was told that if the police could contribute time and personnel, the Chamber of Commerce would donate a system designed to handle the voluminous police files.

Once the police department had acquired the hardware, John Discola, director of marketing for John Cappelletti Associates, a division of Computer Contractors Association, Inc., promised to supply software for the XT on a free-license basis—

Illustration by Dennis Mukai

that is, free of charge. If the system proved effective, Cappelletti, who doubles a a pro football player, planned to expand into other areas of law enforcement.

Three man-years and 1 calendar year later, the system is in place. John Cappelletti Associates called it *HAVES* (Hollywood Area Vice Enforcement System). Though *HAVES* could be adapted easily to any area of police work, the vice unit was chosen as its proving ground.

I holed up in an office to talk "tech" with Herb Shaw, *HAVES*' chief designer, who spent 3 months with the police determining working requirements and design specs for a 1-megabyte program. He laid out the facts about *HAVES* in methodical detail.

HAVES has 384K RAM in its CPU, with 20 million positions available on hard disk and 400K on floppy disk. This database management system can handle as may as 6,000 police cases, with about 2,000 to 2,500 active files. This may not seem like many until you learn that most files include the Hollywood arrest number, the AKA (also known as) name file, a case number, a booking number, a control number, an arrest history file, a charge number—the list goes on to include 18 to 50 cross-referenced files.

Using *dBASE II*, *HAVES* is totally menu-driven and contains approximately 50 separate programs. It produces hard copy, on-line reports, and regular periodic reports, which flash on the screen everything a prostitute wouldn't want you to know.

dBASE II was chosen for the system because it was quick and made input/output routines simple, Shaw said. He was clearly proud of his work. "As a mainframe designer myself, I think it's as good as any mainframe system," he told me.

Before and After XT

The vice unit previously had kept records on cumbersome stacks of yellow cards. Each arrest was represented by a complete card, replete with a Polaroid snapshot. Each time a prostitute was arrested, the staff had to riffle through the finger-smeared stacks.

Now, the system can be fed a number, and it will retrieve data on the subject's outstanding warrants, probation status, citations, field interviews, case-tracking information, and prior-arrest records. Later, this nifty packet goes to the city attorney's office, where folks in three-piece suits can use it to polish up their cases to a fine gloss.

Assignment: Computer Detail

HAVES had, theoretically, put millions of bits of information at the vice squad's fingertips. But who knew how to tap into this great reserve? One of the first staff members to get to know *HAVES* was Sergeant John R. Johnston, head of the Prostitution Enforcement Detail.

When *HAVES* first got underway, he was the man selected to learn about it—from scratch. When he started with computers, he knew nothing about them, he told me with a hint of pride. Now, he is responsible for training the other vice squad officers on the system. He was methodically training two sergeants as he spoke to me.

Johnston, a thick-set man with a round face, looked like a cross between a Marine and a teddy bear. He gestured at the files that were being entered piecemeal into the system. Only 250 or so of the thousands of files had actually gone into *HAVES* at the time.

The office looked like any other windowless government cubby, except for the labels on the battered, gray filing cabinets that read "female prostitutes," "female impersonators," "drags," and "hustlers."

The system was "designed for the officer on the street," Johnston said. "It gives specific information that they can use right away." The field that lists prior arrests is very important since a prostitute's (or any offender's) sentence and bail money increase every time he or she is convicted.

THE VICE UNIT previously had kept records on cumbersome stacks of yellow cards.

Another tricky bit of data is the name the person gives at the time of arrest, usually an alias. Johnston said that for some reason, the AKA often hews closely to the original name; initials, or the first or last three letters, are likely to match. This might not seem logical for one who wants to hide one's identity or line of work. The offenders are persistent, though—one woman had racked up 103 names.

Thanks to *HAVES*, the intake officers no longer need to search through the cards to pair a new AKA with the same old face—the menu-driven *HAVES* can add the latest alias to the list faster than a hooker can ask for the time.



Sgt. Roger Dowis, of the LAPD's Hollywood Division, on duty at the PC-XT.

Johnston pointed out another field, labeled "associates." This is where names of people who are linked with the arrestee are entered. It is how the vice unit does "battle with the pimps," he said. The arresting officer can list a suspected pimp, or the other prostitutes in the pimp's stable. While this won't directly convict anyone, it's often helpful as supporting evidence. The "associates" also can be contacted in case police need to locate someone as a witness or for questioning.

Some prostitutes, because of the overcrowded courts, have a virtual sackful of cases awaiting trial. Johnston mentioned one woman who had 19 cases on the docket. Sometimes these cases can be consolidated into a single arrest, and a system like *HAVES* makes it easier. Johnston suggested that "the courts probably need automation more than we do."

Getting the data into the system is still a time-consuming process. Six officers process the data gathered at arrest time, but the prostitution detail relies on a volunteer labor force that works with the division to load the backlog of information into the system, Johnston said.

One striking feature of *HAVES*, I discovered, is that it tracks not only AKAs,

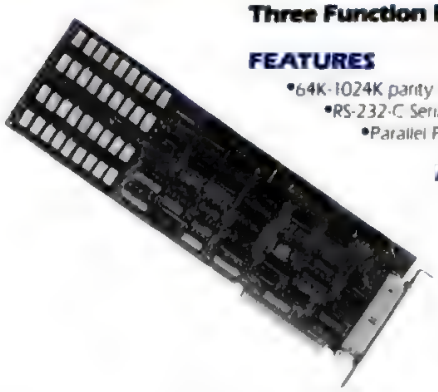
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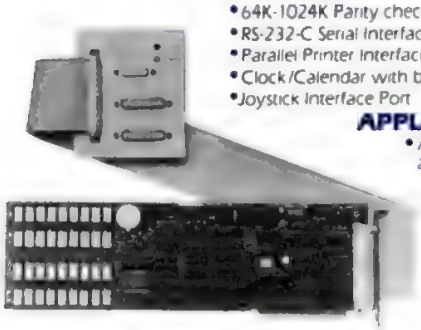
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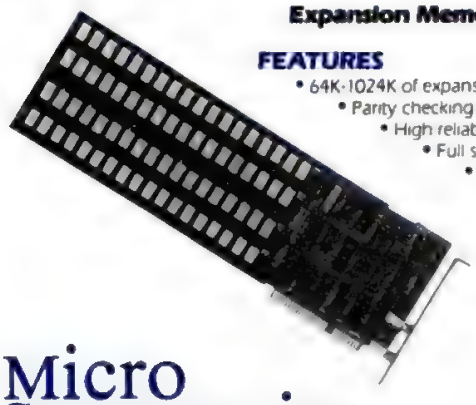
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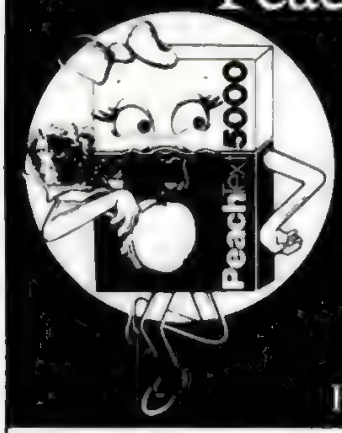
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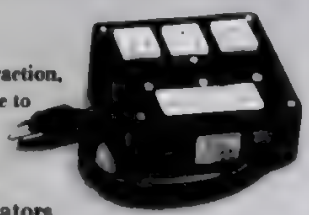
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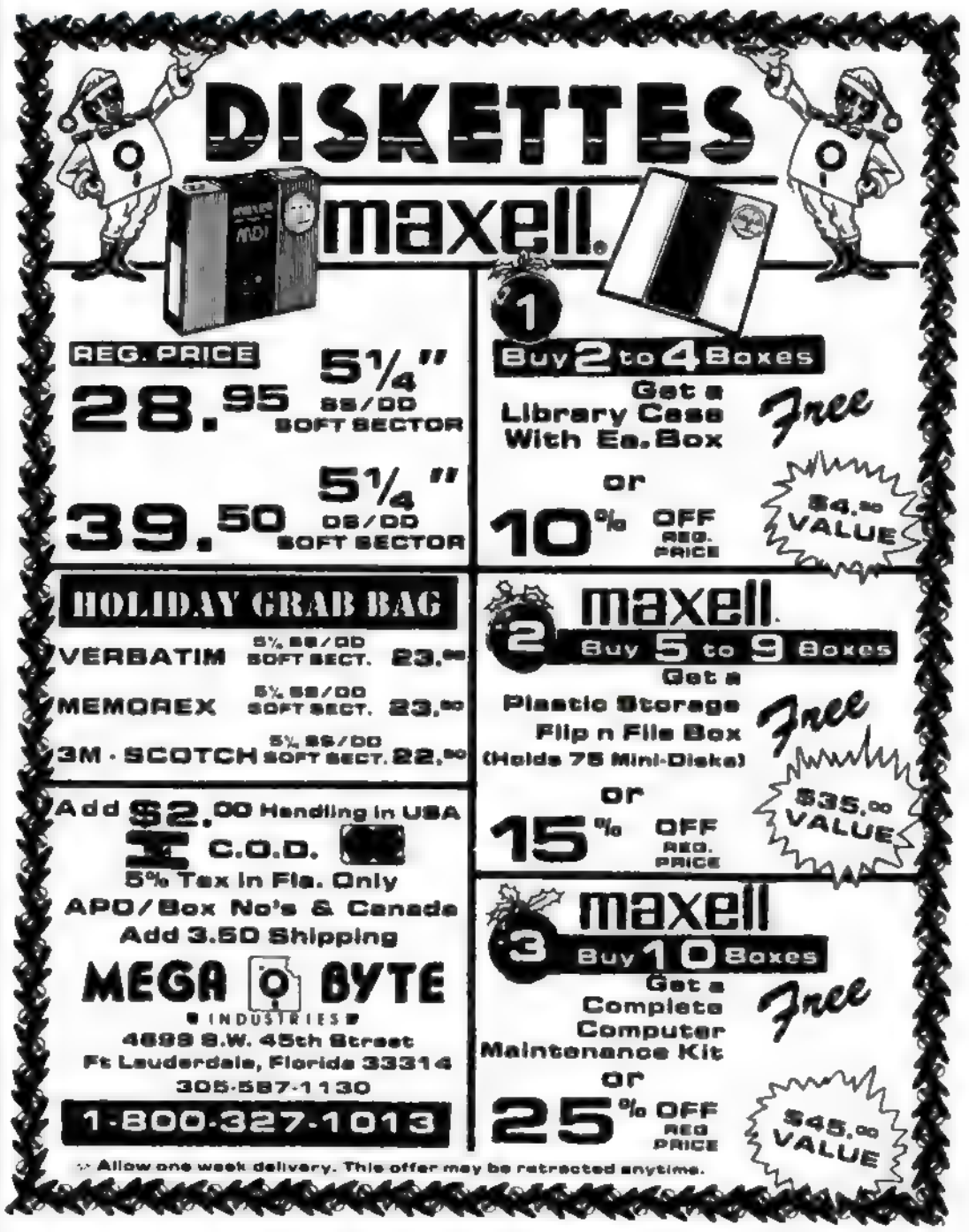
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active warrants, and prior arrests for the offiers' use, but also the final disposition of cases and other post-booking information. Officers are required to keep tabs on the progress of their cases through the courts, and they check back with *HAVES* periodically for court dates and dispositions of cases.

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Wrapping up our session, Johnston took me down to where the officers were processing arrests from the latest sweep. I stared at the women in their too-tight shorts and dresses and at the police officers in their shorts and jeans. The image they brought to mind was of a party that should have broken up hours ago.

I said goodbye and walked out of the building into the steamy Hollywood afternoon. For me, the day was ending. I headed home through the snarling 5 o'clock traffic and mentally replayed my conversations with Johnston and the other people involved with *HAVES*. I thought about the officers; soon they would be hitting the streets on another sweep. I also thought about the prostitutes, and I wondered if they know that the toughest cop on the beat has a heart of silicon. */PC*

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Part of the reason that PIE:Writer is the top ranked word processor is that it's just plain simple to run. In fact, you can use it as soon as you get it home. To write a letter, for instance, just (a) load the program, (b) type the letter 'E', and (c) write your letter. Then, (d) type 'F' to enter the print mode for either screen or paper and you're ready to print. You'll get a perfectly typed, spaced and formatted letter. Now what could be easier than that?

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Don't confuse our use of the word simple with unsophisticated. PIE:Writer offers features and capabilities far beyond any other word processing programs for microcomputers. And that goes for most of the dedicated word processors as well. Here are just a few:

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- You can customize the design of your letters and reports with integrated centering, bold facing, special tab features, mail merge capabilities, automatic page numbering, line lengths and much more.
- PIE:Writer is also compatible with both the Apple IIe and IBM Personal Computer and other popular compatibles.

	Operating system(s) and/or machine(s)	Price	Overall Score
CPT 8100	dedicated word processor*	$15,000	94¼
Dictaphone Dual Disp.	dedicated word processor*	$13,500	85¼
PIE:Writer:	**Apple II, IBM PC**	**$149.95 $199.95**	**84¼**
WordStar	CP/M†, Apple II, IBM PC	$500	80
Easywriter	IBM PC**	$175	35

*Includes word processing hardware & multistation support. †Requires additional CP/M Hardware for your personal computer ($200-600 extra). CP/M is a registered trademark of Digital Research. *VisiCalc © is a registered trademark of VISIcorp. **Very similar program called Easywriter Professional, available for the Apple II.

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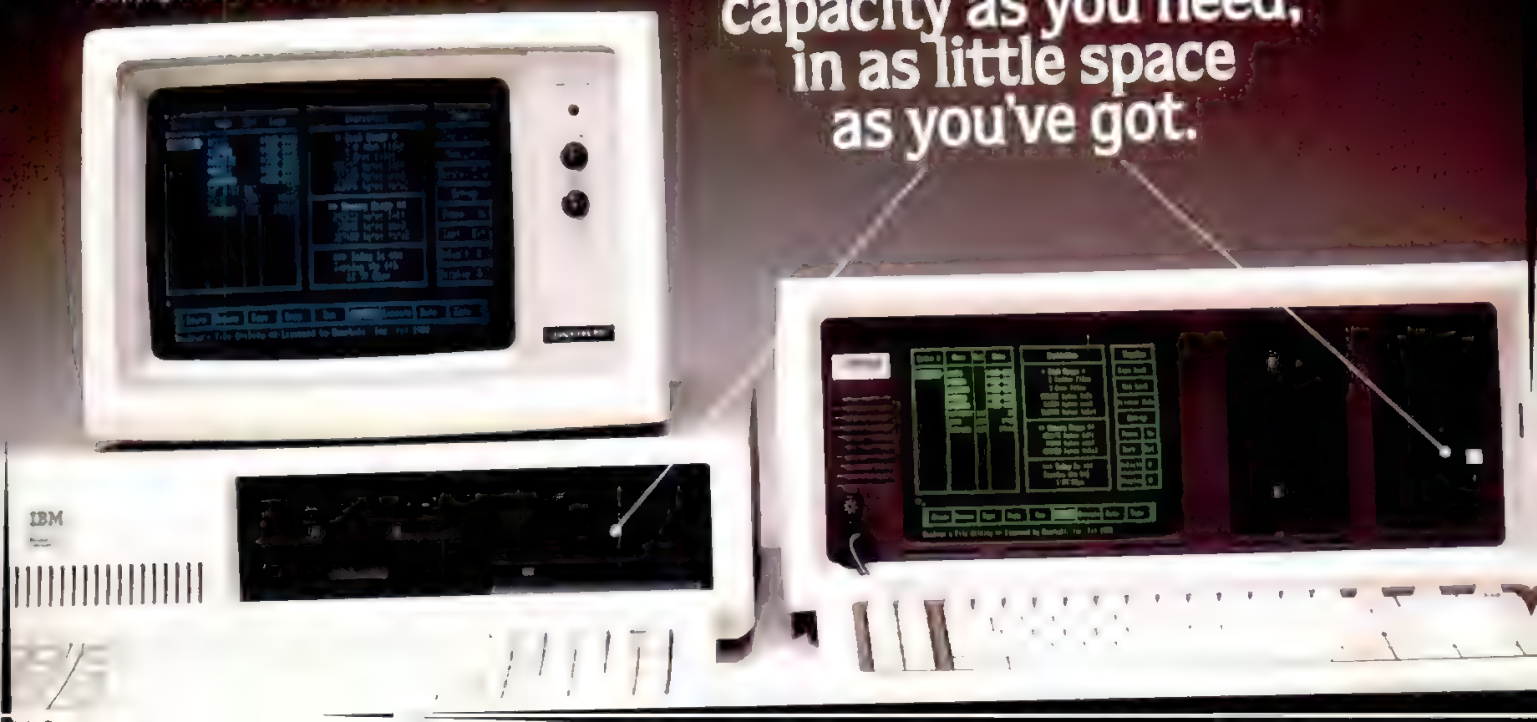
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CIRCLE 521 ON READER SERVICE CARD

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This Little PC Went To Market

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CIRCLE 618 ON READER SERVICE CARD

To most investors, the commodities market is an exotic no-man's land. The images that come to mind include a tight circle of screaming traders, a flurry of obscure hand signals, and a dark room with a highly polished table, around which are gathered the fabled gnomes of Zurich. This view of commodities trading is typified by the movie comedy *Trading Places* in which Dan Aykroyd and Eddie Murphy amass a tremendous fortune in a few short minutes of trading in orange juice futures. Every investor who has ever bought a stock, invested in a pork belly, or traded a baseball card in the hope of making an instant profit has secretly shared in the fantasy of this movie.

In actual practice, the various commodity markets serve the important business function of allowing the commodity producer or commodity consumer to establish a fixed price that will be paid or received for a given commodity at a future date. The contract standardizes the quantity and quality of the commodity traded, and specifies the future month of delivery and the price to be paid. Unlike an option contract, which gives you the right to buy or sell at a given price, a futures contract commits you to buy or sell at that price.

Commodity markets initially were developed to satisfy the needs of food producers and are usually associated with foodstuffs and with precious metals. Some major exchanges are the Chicago Board of Trade (CBT) for grains, the New York Commodities Exchange (Comex) for metals, and the Chicago Mercantile Exchange for cattle and hogs.

In the past few years, an increasing number of financial futures markets have developed. The International Money Market (IMM) offers foreign currency futures, the CBT now offers government securities, and the Kansas City Board of Trade provides a futures market for the price of the Value Line Stock Index.

The Commodity Strategist

If you're ready to try your luck on the commodity futures market, Avinco Corporation has put out a program called *Auto Trader* that makes specific recommendations on the buying and selling of commodity futures contracts. When supplied with a price history and a user-defined trading strategy, *Auto Trader* will print daily recommendations on each contract that you follow. It tells you the price at which to get in, and will subsequently indicate the price at which to get out to protect your profit or to minimize your loss. What's your part in this partnership? You simply decide whether to back its recommendations with your money.

The basic premise of *Auto Trader* is that market opportunities can be uncovered by comparing the day's trading range for a particular commodity with a closing-price moving average. A moving average is calculated by averaging the closing prices for a given number of days—you can choose to tally 5-day, 8-day, or 30-day averages. When this process is repeated using successive average closing prices, a moving average trend line can be drawn. Though this line will approximate the daily price line, it will smooth out the effect of price fluctuations on individual days. The greater the number of days included in the moving average calculation, the

greater its dampening effect. For example, a 5-day moving average will follow the daily price much more closely than a 30-day moving average.

Moving averages are widely used by technical analysts to highlight trends in particular markets. When a market changes direction, the actual price of the commodity will, at some point, cross the moving average. In a market that has been falling, this would be a good time to buy. Alternatively, the market may continue to fall, and the price rise that crossed the moving average may have indicated a merely temporary rally. In that case, it would have been an excellent time to sell or go short.

Trading Strategy

Auto Trader's recommendations are based on trading strategy that you define, and the application of that strategy to a price history. By comparing the daily price range to the moving average, *Auto Trader* will generate buy or sell recommendations.

The most important element in the trading strategy is your choice of how many days to include in the moving average. But there are other factors to consider as well. You must specify the number of days of price history to be examined. This enables you to exclude periods that you feel do not reflect current market behavior. You also may restrict *Auto Trader* to generate only buy or sell recommendations. This is useful if you are hedging a commodity that you already own, or if you are monitoring stock prices but do not wish to take short positions.

You also may specify an aggressiveness factor. *Auto Trader*'s recommendations are always at a specific price (for instance, buy gold at 425.50) rather than at market. *Auto Trader* apparently calculates an internal absolute price and uses the aggressiveness factor to establish a wider band (for the adventurous) or a narrower band (for the timid) around this price.

Once you enter a buy or sell position on a particular commodity, *Auto Trader* generates Stop Loss recommendations. It has a feature to base its stop prices on shorter-term moving averages than its Entry recommendations. This tends to protect profits by allowing you to sell out more quickly if the price reverses. It also has a provision to stand aside for a given number of days after closing out a position. This gives you a chance to catch your breath, breathe a sigh of relief or regret, and watch which way the market moves next.

As you can see, the definition of the trading strategy is the crucial element in using *Auto Trader*. To help you in this endeavor, the system provides the Strategy Test report. It permits you to test a range of strategies over a desired period. You indicate the number of days to test and the high, low, and increment values for the moving average. *Auto Trader* will then tabulate the net results from the trades it would have made in this period, running through the various moving averages from the low to the high. For example, if you specify 20, 8, and 4 as your high, low, and increment, you will see the net results using moving average values of 8, 12, 16, and 20.

BY COMPARING the daily price range to the moving average, Auto Trader will generate buy or sell recommendations.

The Package

The *Auto Trader* package contains a demonstration disk, an instruction manual, and a production disk enclosed in a plastic wrapper. The first page of the manual states that if you return the package within 10 days, with the production disk unopened, your purchase price will be refunded. The production disk contains a price history for five active contracts, current to the shipping date.

If a program can pick winning trades, I'm willing to be very forgiving about minor details of user friendliness. Unfortunately, I felt that *Auto Trader* required that I forgive quite a lot. Beginning with the demonstration disk and following the instruction manual, I attempted to open a new commodity contract. After several unsuccessful attempts, I discovered that the system accepts uppercase characters only. The production disk corrects this problem by automatically setting the CapLock and NumLock keys and leaving them set when you exit.

Having created a file, I then began entering prices. The demonstration disk contains a price history for Dec 81 Corn, with prices through Dec 4. The prices to be entered are open, high, low, and close, along with a date. This routine will accept just about anything, including invalid or out-of-sequence dates, highs that are less than lows, and closing prices outside the day's trading range.

At the end of each set of prices, you are given an opportunity to correct the entries. There is also an extended edit function, which permits you to correct entries from prior days. In using this function with the demonstration program, I somehow clobbered the system's table of stored dates. At that point, all I could do was reboot the system and recopy the original files to my working disks. As I never encountered this problem in the production system, I contacted the manufacturer, who informed me that the coding for this feature on the demonstration disk is intended to prevent its being used as a production tool, but is not meant to wipe out the test files. He stated that he expected to correct this problem in future releases.

Auto Trader can generate very attractive plots of commodity prices and moving averages, either at the terminal or on an Epson printer with Graphtrax Plus. The documentation indicates that they will try to adapt the hard-copy plots to other printers. When plotting at the terminal, you can include the actual prices and one or two moving averages. Some people feel that significant market shifts are best found where two moving averages (say a 5-day and 30-day) cross. If you subscribe to this belief, then you'll love the plotting feature.

Since I wasn't particularly eager to experiment with Dec 81 Corn, I now switched to my production disk. This contained pre-established history files on current contracts for Corn, Hogs, Cattle, Gold, and TBonds. When I listed the *Auto Trader* directory, I saw that none of these files had been established to the system. Since I had to set up the files anyway, I thought I might as well try to create some duplicate copies. Therefore, in addition to AUG GOLD, I created AUG 83GOLD and AUG

MOVING AVE.	NUMBER OF TRADES	NET	BAL-ANCE OPEN	LOW	NO. PROFIT TRADES	AVE. PROF-IT	NO. LOSING TRADES	AVE. LOSS	LAST PRICE	TRADE: POSITION
4	9	−1815.01	−1885.01	−1815.01	3	378.33	6	379.17	448.50	SHORT
5	9	−1423.00	−1493.00	−1423.00	3	513.33	6	381.33	448.50	SHORT
6	7	1015.01	0.00	0.00	5	352.00	2	110.00	447.40	ASIDE
7	7	879.28	0.00	−45.00	5	330.86	2	125.00	446.23	ASIDE
8	5	1357.46	1577.46	−692.51	3	549.99	2	408.76	447.00	LONG
9	6	26.64	246.64	−2365.00	4	726.39	2	1214.45	447.00	LONG
10	6	−2777.01	−2540.00	−3461.00	1	1160.00	5	697.40	446.83	LONG
11	6	−2870.91	−2603.64	−3401.82	1	900.00	5	664.18	446.53	LONG
12	5	−3219.17	−2988.34	−3726.67	1	900.00	4	936.04	446.89	LONG
13	5	−2826.54	−2606.54	−3358.84	1	900.00	4	837.88	447.00	LONG
14	4	−621.44	−601.44	−2315.00	2	954.64	2	1215.36	447.00	LONG
15	3	1975.66	2195.66	0.00	2	1200.67	1	200.67	447.00	LONG
16	4	−2246.24	−2026.24	−2779.37	1	900.00	3	948.75	447.00	LONG
17	4	−2876.47	−2656.47	−3338.82	1	900.00	3	1158.82	447.00	LONG
18	4	−2896.12	−2676.12	−3320.00	1	900.00	3	1165.37	447.00	LONG

Auto Trader's Strategy Test report on author's trading in August Gold as of May 13.

83GL. The system accommodated this setup, and it allowed me to run multiple strategies on the duplicate files. To establish the price history for these files, I simply copied the supplied AUGGOLD DAT to new files, AUG83GO.DAT and AUG83GL.DAT.

Testing August Gold

I ran a number of tests on AUG GOLD and could not find a clearly advantageous trading strategy. The Strategy Test program provided little in the way of assistance in defining an effective strategy. The Strategy Test report shows results of trades, divided into profitable and losing trades, but you do not see the dates or prices of the individual recommendations. Thus you have no good way of assessing the relationship between a given strategy and a particular set of market conditions. Since your basic decision is whether or not to believe the recommendations generated by *Auto Trader*, the more information provided here, the higher will be your level of confidence.

I found this particularly true when a Strategy Test generated highly variable results. In testing a set of strategies for gold prices, I found an 8-day moving average generated a $1,200 profit while a 10-day moving average generated a $2,000 loss. Without additional detail, there is no way to gauge if this was luck or a significant difference in the moving average value.

When I entered parameters for the Strategy Test, the screen said to enter a number between 3 and 12 for the Stop Layoff Interval, while the documentation said to enter a value between 0 and 4. When I used a value of 10, the system locked up, and I had to reboot to escape. After the parameters have been entered, you are asked if they are correct. If you respond by pressing N, the parameters are wiped out and you must re-enter all of them. Still, if the program can pick winners . . .

EXPECT to spend a great deal of time experimenting with different test strategies on different data samples.

I finally reached the Daily Update and Trading module, the routine in which the current day's prices are entered and a recommendation, if any, is generated. At this point, I was processing late May price data for an August gold contract. The routine accepts the open, high, low and close prices for a contract and then generates its recommendation. If you do not yet have an established position, the recommendation will be to buy or sell at a particular price, or to stand aside (do nothing). If you already have a position, a stop price will be recommended. *Auto Trader* will not increase a position you have already taken by recommending that you buy or sell an additional contract. After several days of trading recommendations, and having taken one small loss in buying gold, on May 24 I was advised to sell gold in all three of my test accounts.

Between May 27 and June 3, the price of gold fell by over $40. Had I actually followed the recommendations provided by *Auto Trader*, I would have made a profit of over $4,000 for each short position held during this period. Was it a lucky chance? As I've said, I'm willing to be quite forgiving about troublesome details.

A Good Idea, But . . .

The inability to find a consistent winning strategy for a particular commodity is not, of itself, a criticism of the program; it is, rather, a warning to the reader. Expect to spend a great deal of time experimenting with different test strategies on different data samples. If selecting a winning strategy were easy, there'd be a lot more rich commodity traders around.

I found it somewhat limiting that the recommendations were tied to the price entry routine. If you make a mistake that you don't catch until after the recommendation is generated, there does not appear to be any way to recreate the recommendation. Separating these functions also would provide some flexibility in testing what-if or within-day (before closing) conditions. You might want to enter mid-morning prices and see if any change in

direction was indicated.

I would feel much more at ease if the recommendations were accompanied by an explanation of why a particular recommendation is made. The risks involved in an open commodities position can be substantial, and any information that can improve the confidence level of the system user would be most welcome.

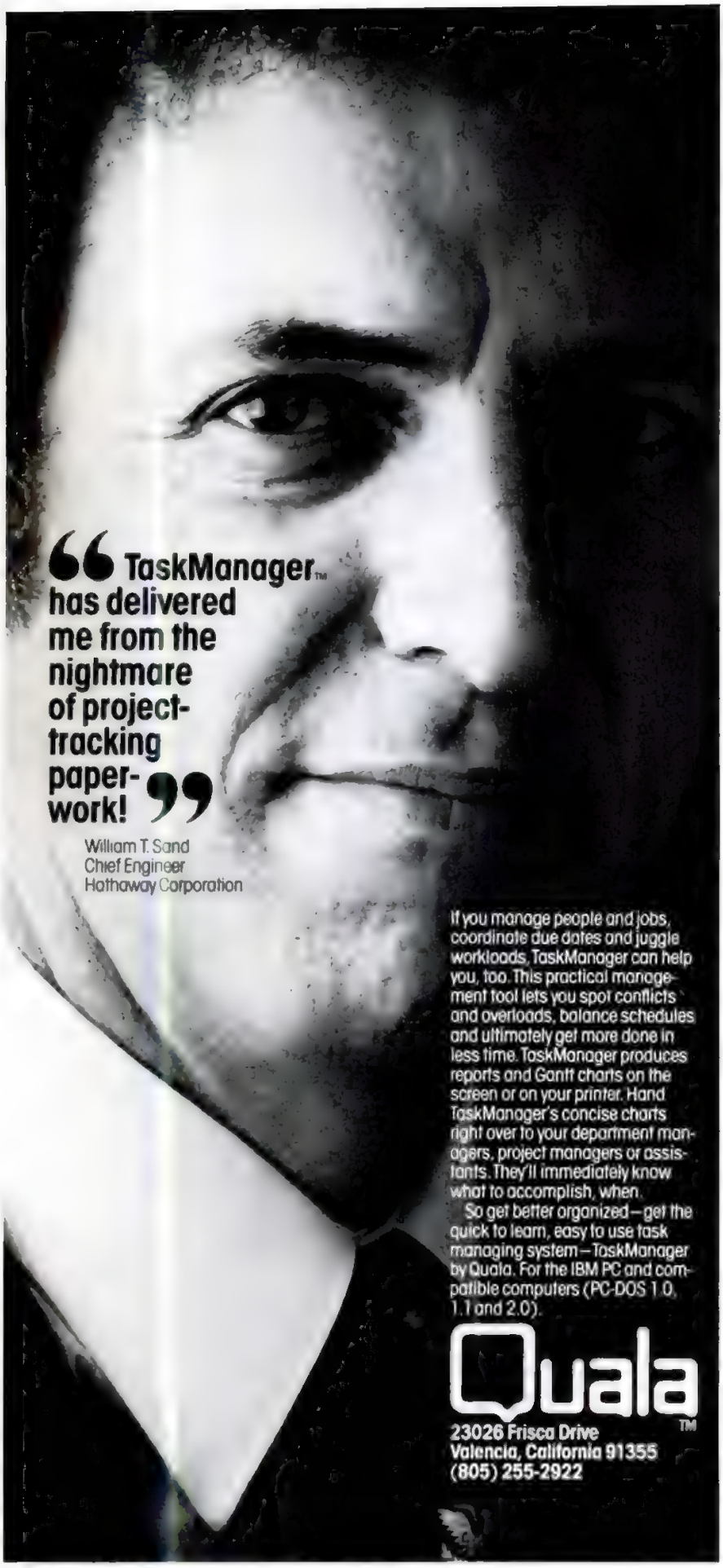
My overall reaction to *Auto Trader* is that I like the idea, but I'm disappointed in its execution. The graphics and plotting functions are useful, but they can be obtained less expensively from several general-purpose graphics packages. The real reason for buying *Auto Trader* is for its predictions, and in this area I felt it adopted too much of a black-box approach.

WHEN A market changes direction, the actual price of the commmodity will, at some point, cross the moving average.

While the operation of the package is well documented and quite easy to follow, the written documentation of the strategy parameters seemed purposefully vague and sketchy. This was carried through in both the Strategy Test report and in the actual recommendations.

Commodities trading is relatively high-risk investing. A great deal of money can be made or lost very quickly. If you put up the money for a package like *Auto Trader*, I think you should be provided with a lot more of the detail of what's happening inside. Your PC is a powerful analytic tool, but you'd better know what's being analyzed. Finding out the hard way could prove very expensive. */PC*

Bruce Nissim has been an international banking consultant since 1976. His company, Nissim Associates, sells foreign exchange and multi-currency accounting systems for the IBM PC.



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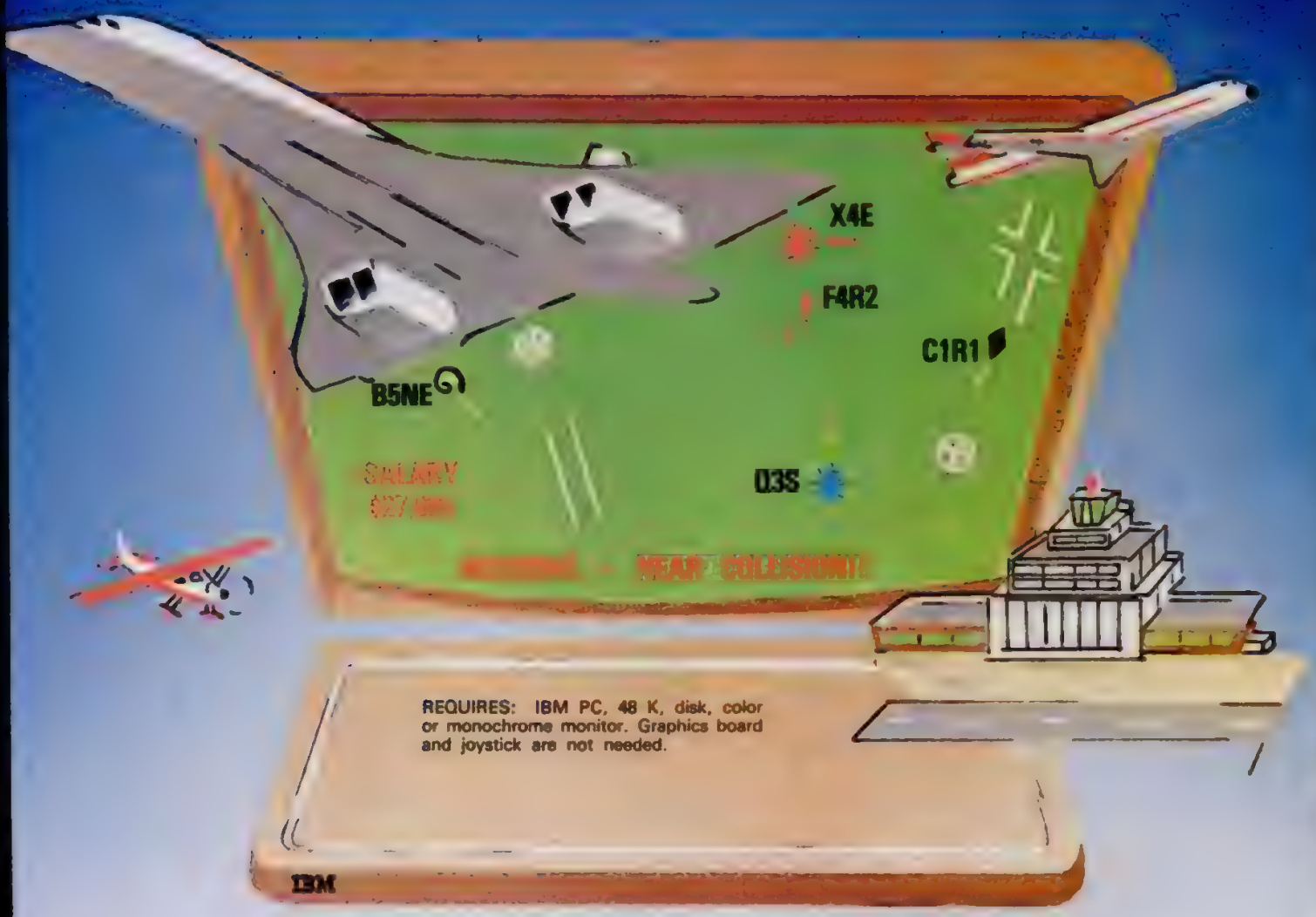
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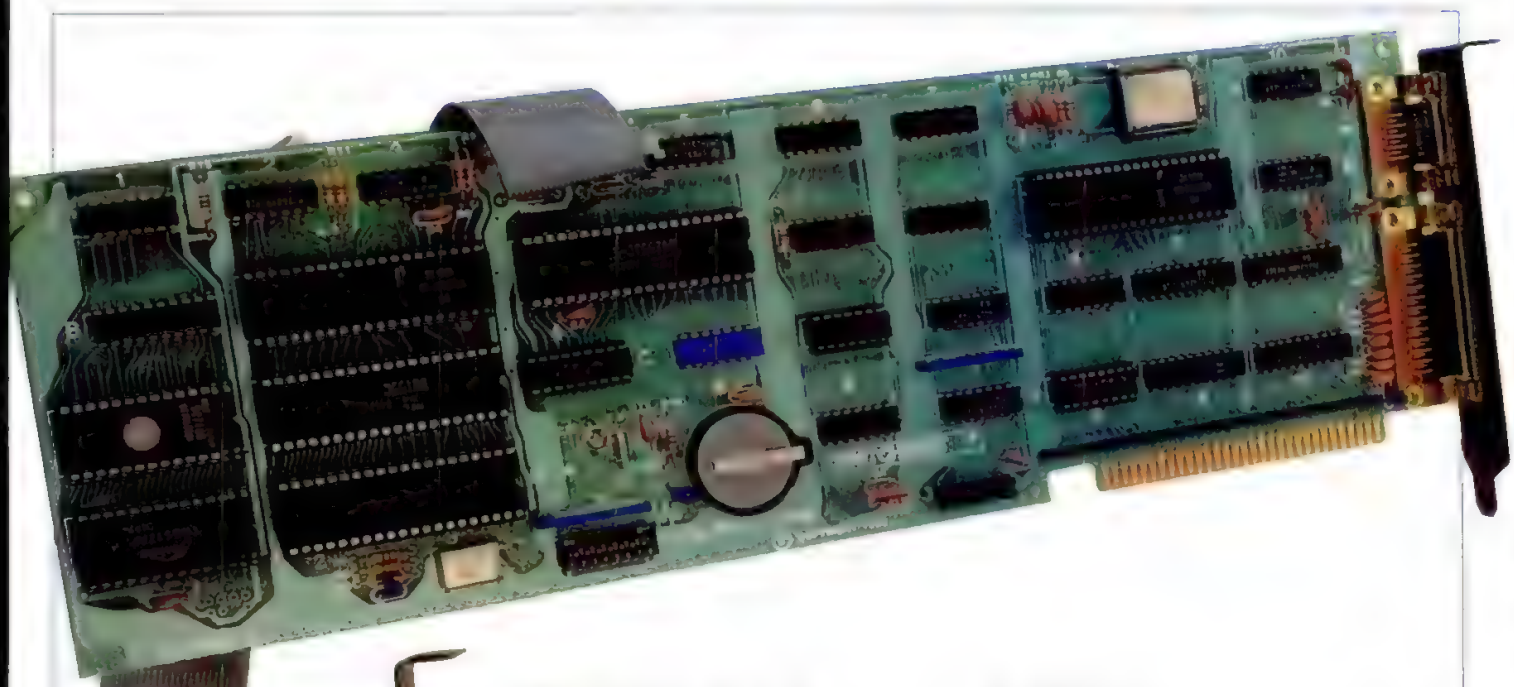
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Real estate agents and brokers in Santa Barbara, California, are discovering the advantages of desktop computing, IBM style, for tracking residential sales and managing properties, among other tasks.

The PC Moves Into Real Estate

The IBM Personal Computer has entered the real estate market in a big way. Across the United States, IBM PCs and XTs, as well as the PC compatibles, are showing up in real estate offices as the agents and brokers take advantage of the capabilities of desktop computing, IBM style.

The National Association of Realtors (NAR) and other state associations representing realtors have recognized the general movement toward computers and are now marketing real estate related software. Much of this software is written for the IBM PC, and a surprisingly large number of the products are demonstrated on IBM PCs.

Computers have become increasingly common in the business of buying and selling property. From the individual real estate office, the Board of Realtors, and the Multiple Listing Service, to the title companies (which handle the legal aspects of sales), and financial institutions, computers are processing thousands of bits and bytes of information for real estate transactions.

More and more of these transactions are processed through IBM PCs. The PC is viewed by many as the major force in getting the job done in real estate. It saves time in a professional, effective, and productive manner.

The local real estate market in California's coastal Santa Barbara area is a good example of the PC's widespread use in the real estate business. Individual offices and companies are using the PC and even the XT for everything from tracking residential sales and clients, to managing properties.

The Santa Barbara Board of Realtors has installed three IBM PCs to handle just about all of its administrative workload, including word processing, membership information, budgeting, financial projections, and bookkeeping. This computerized administrative system has now become a model that other Boards of Realtors in the state of California are evaluating for implementation.

Administrative Applications

One real estate office in Santa Barbara is using the PC in many unique and creative ways. Gene O'Hagan Associates is a medium-sized office with approximately 12 agents. O'Hagan's Montecito office now utilizes the IBM PC to solve problems that are common to just about every real estate office.

Michael Baran, office manager of the company, has designed a complete administrative system based on the IBM PC. He keeps track of each agent's business by breaking it down into four categories: production, number of current listings, number of listings sold, and commission splits.

Commission splits, an area that was

once particularly troublesome, is now handled using Lotus' program *1-2-3*. Once the data for the agents has been entered, *1-2-3* figures the commission schedules automatically.

"What makes commission splits so difficult to keep track of," says Baran, "is that commissions are based on production, volume, and other factors. Now, with a PC, keeping track of them doesn't take any time at all."

Keeping track of information is the focal point of Baran's job, and the PC is used primarily for that task. Using *Infostar* by Micropro, Baran monitors each piece of property, how often it has been shown, its advertising and client-related costs, and other factors.

The result is that Baran easily can analyze the total picture, and answer the question: How much does it really cost to sell each house? Quick access to such information both impresses clients and shows the most effective way to market a piece of property. Administrative costs also can be kept down; advertising dollars are now spent more wisely.

THERE ARE times when we think Michael will one day sprout little antennas on his head from all the time he has spent setting up this system.

Gene O'Hagan, the man who put up the money for the IBM PC system, sums up Baran's computerized office this way: "There are times when we think Michael will one day sprout little antennas on his head from all the time he has spent setting up this system, but seriously, what he has created in the past few months has been a most effective communications and record-keeping system.

"We now keep track of everything on the PC. It's easier to plan in this business when you can find out instantly where you are, the status of any property, and the needs of any client."

Baran also uses *WordStar* with the PC as a tool to write all of the real estate ads and information sheets for the company. "You can be more professional, more efficient and do much, much more," Baran says, adding, "My own output has at least tripled since I've been using the IBM PC."

Accessing Multiple Listings

O'Hagan Associates is taking advantage of another aspect of today's computerized real estate world. Through the

Figure 1: A real estate agent can search for properties to match a client's specifications by using the Santa Barbara Board of Realtors' on-line Real Trieve system. This particular search resulted in 22 matches. The letter N, preceding the Multiple Listing Service numbers in the leftmost column, indicates a new listing. The rightmost column, PSFRW, indicates the presence of a Pool, Spa, Family room, parking for Recreational vehicle, and Wheelchair access, respectively.

```
FUNCTION? PRI
Prospect Input

ENTER PASSWORD BELOW
xxxxxx

ADD OR DELETE RECORD? A                PROSPECT NAME? BIL ALVERNAZ
ADDRESS? 1415 CHAPALA STREET           PHONE? 967-7207
PROPERTY TYPE? 1                       DISTRICT? 15
ENTER ADDITIONAL SEARCH PARAMETERS, HIT  RETURN  WHEN DONE
  BR=?
? LP=150,000-200,000
^
ADDED PROSPECT #10

ADD OR DELETE RECORD?

FUNCTION? PRS
Prospects Search

ENTER PROSPECT NUMBER(S)? 10

BIL  ALVERNAZ                          PROSPECT #10
1415 CHAPALA STREET
967-7207

  LISTING    ADDRESS          AREA    PRICE    DEC  BR BATH ST  GAR  PSFRW

  08301165  3612 SANTA MARIA L   15  $152,000  124   3 1.5   1  2.0    Y Y
  08[illegible]  588 CALLE [illegible]  15  $154,[illegible]  161   3 2.0   1  2.[illegible]    Y
  08[illegible]  1655 CAMELIA LN   15  $154,[illegible]  [illegible]   3 [illegible]   1  [illegible]    -
  08701654   146 BALINAS W        15  $154,950  170   3 2.0   1  1.0    Y
  08[illegible]  490 CONEJO RD        15  $159,000  170   3 1.0   1  1.0    Y
  08207912   623 FIGUERDA ST E    15  $159,000  389   3 1.0   2  YES    Y
N 08[illegible]  [illegible] CLARA RD        15  $159,[illegible]  [illegible]   3 [illegible]   1  [illegible]    [illegible]
  08311201   541 MOUNTAIN RD      15  $165,000   70   3 2.0   1  2.0    Y
  08[illegible]  3554 CALLE ROSALES   15  $165,[illegible]  [illegible]   3 [illegible]   1  [illegible]    Y
  08[illegible]  511 VIA MORO         15  $167,[illegible]  [illegible]   3 [illegible]   1  [illegible]    -
  08799431   1971 ARUNA ST        15  $169,000  169   3 1.5   1  YES    Y
  08365046   477 MOUNTAIN DR      15  $169,000  370   3 1.0   1  YES    Y
  08[illegible]  [illegible] LAS ALTURAS A   15  $169,[illegible]  [illegible]   3 [illegible]   2  [illegible]    Y
  08[illegible]  645 LA [illegible] RD      15  $169,[illegible]  [illegible]   3 [illegible]   1  [illegible]    Y
N 08302770   114 IBLA ST E        15  $169,950  113   3 1.5   1  2.0    Y
  08703447   3080 CALLE ROSALES   15  $177,500  169   3 2.0   2  CP     Y
  08[illegible]  318 CALLE MANZANI    15  $177,[illegible]  [illegible]   3 [illegible]   1  [illegible]    YY
  08710128   1361 DE LA GUERRA    15  $178,500  220   3 2.0   1  CP     Y
  08[illegible]  2677 MONTROSE PL     15  $179,500   87   3 2.0   1  2.0    Y
  08[illegible]  2687 DORINDA PL      15  $182,000   31   3 2.0   1  2.0    YYY
  08[illegible]  703 CHELTENHAM RD    15  $185,[illegible]  [illegible]   3 [illegible]   1  [illegible]    Y
  08701253   844 CHELTENHAM RD    15  $189,500  180   3 2.5   3  2.0    Y

NUMBER OF PROSPECTS FOUND = 22
```

Figure 2: An agent using the Amortization Schedule of the Santa Barbara Board of Realtors' on-line system need only type in AS to get started. The questions are self-explanatory and the answers provide information to prepare a complete and professional document, using the IBM PC.

```
FUNCTION? AS
Amortization Schedule

AMORTIZATION SCHEDULE

 1. ENTER AMOUNT OF LOAN      :  50,000
 2. ANNUAL INTEREST RATE      :  10
 3. NO. OF PAYMENTS PER YEAR  :  12
 4. TOTAL NUMBER OF PAYMENTS  :  36
 5. PAYMENT AMOUNT (OPTIONAL) :
 6. BALLOON PAYMENT (OPTIONAL):
 7. FIRST PAYMENT MONTH #     :  12
 8. FIRST PAYMENT YEAR        :  82
 9. START BEGINNING WITH YEAR #:  1
10. END SCHEDULE WITH YEAR #  :  2
11. ANNUAL TOTALS ONLY (Y/N)  :  N

THE FOLLOWING DATA IS FOR INFORMATION PURPOSES ONLY AND THE ACCURACY OF THE
FIGURES HEREINAFTER SET FORTH IS NOT GUARANTEED.

PYMT#  MO/YEAR     PAYMENT     INTEREST     PRINCIPAL     BALANCE
                                                         50000.00
   1   12/1982    1062.35      416.67       645.68       49354.32

1982 TOTALS       1062.35      416.67       645.68

   2    1/1983    1062.35      411.29       651.06       48703.26
   3    2/1983    1062.35      405.86       656.49       48046.77
   4    3/1983    1062.35      400.39       661.96       47384.81
   5    4/1983    1062.35      394.87       667.48       46717.33
   6    5/1983    1062.35      389.31       673.04       46044.29
   7    6/1983    1062.35      383.70       678.65       45365.64
   8    7/1983    1062.35      378.05       684.30       44681.34
   9    8/1983    1062.35      372.34       690.01       43991.33
  10    9/1983    1062.35      366.59       695.76       43295.57
  11   10/1983    1062.35      360.80       701.55       42594.02
  12   11/1983    1062.35      354.95       707.40       41886.62
  13   12/1983    1062.35      349.06       713.29       41173.33

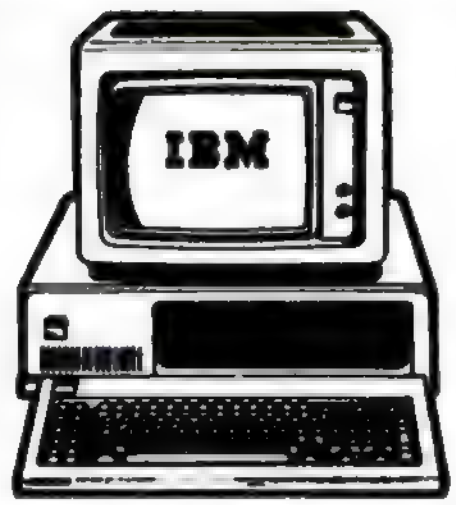
1983 TOTALS       12748.20     4567.21      8180.99
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Board of Realtors, it is linked to a system called Real Trieve. This system, through the use of a modem, connects the IBM PC (or any other computer with an RS-232 serial port) directly to the Multiple Listing Service's main computer to take advantage of what is called "on-line access."

The system allows real estate offices to access more than 2,000 listings in the Multiple Listing Service. An individual real estate office, such as O'Hagan's, can hook into the system at any time of the day or night and obtain specific information to meet clients' needs.

Baran says that clients sitting in the office are impressed by the PC's ability to instantly search for property that meets the given specifications. To conduct a search with Real Trieve's on-line system, the agent signs on to the on-line system (see Figure 1) and types in PRI, which stands for Prospect Input. A password is then entered, followed by specific information about the client.

Say, for example, that the agent wants to search a particular district of Santa Barbara, which the on-line system has designated as area 15. The client is looking for a three-bedroom home in a $150,000 to $200,000 price range. Now that the specifications have been given, the agent enters PRS (for Prospect Search), which initiates the search. The result is 22 matches, shown in Figure 1.

This method of searching for property saves both the consumer and the real estate agent time. Details about the properties are listed in the printout (see Figure 1): the number of bedrooms and bathrooms, the size of the garage, the number of stories (single or two-story), and such extras as a swimming pool, a spa, a family room, recreational vehicle parking, and wheelchair access. Also, for the agent's convenience, the listing office is given.

The on-line system has many other capabilities, some of which are listed below.

- Residential analysis—Aimed at the first-time home buyer, this feature calculates the financial savings when tax breaks and equity build-up are taken into account.
- Amortization schedules (see Figure 2)—This feature enables the agent to show what the monthly mortgage payment will be, and how much of that payment applies to interest and principal, respectively. Year-end totals are also given.
- Caravan lists—A list of properties to be shown. At any time the agent can printout a list of properties to be shown for the week.
- Comparative market analysis—With this report, an agent can show which properties have sold, which are currently on the market, and which listings have expired. The report can be used as a tool to generate computerized statistics that compare prices of a number of properties in a particular area, and are used to determine which ones are priced competitively.

USING THE on-line system to conduct a property search has a certain authority to it that going through the listings book just doesn't have.

Says Baran, "Using the IBM PC to do comps (the comparable searches) means we don't have to go through the Multiple Listing Book. What used to take hours to accomplish can now literally be done in minutes on the PC through the on-line system."

Baran also points out an added benefit of using the on-line system: "Conducting property searches, comps, or even amortization schedules has a certain authority to it that going through the listings book just doesn't have."

The creative uses for the PC in real estate don't stop with the on-line system; in fact, they really just begin there.

Property Management

R. Peter Jackson, president of Mariposa Real Estate in Santa Barbara, is coming up with such innovative real estate and property management software for the PC that other realtors already have expressed interest, even though it is not commercially available.

Jackson, whose business operation covers both Santa Barbara and Ventura counties, started out with an IBM PC a year ago and recently added an IBM XT. The programs that Jackson will soon market are actually overlays for *dBase II*. He also uses *WordStar* for his word processing needs and *Multiplan* by Microsoft for real estate analysis.

Through his special *dBase II* programs, Jackson keeps track of dozens of pieces of information on the over 1,000 units his company manages. Such items as tax assessor parcel numbers, insurance policy numbers, loan data with lenders, and homeowner association numbers can be searched for with this program.

One of the most unusual offshoots in Mariposa Real Estate's stable of property management software is a program Jackson uses to track down violators who park in the lots provided for the occupants of both his commercial and residential units.

"We have someone checking the parking lots from time to time, writing down license plate numbers," he says. "Then we plug all of that information into the XT to compare license numbers against what we have in our records. After four or five such surveys, we can tell if tenants or visitors are using the parking. From that point on we have control; the violators end up being towed away, while the tenants are happy."

When Jackson started with computers five years ago, he used a PolyMorphic system, but now he wouldn't trade his PC or XT for anything. He has the PC at home and the XT at work. "Work often gets to be a rat race, so it's nice to have the PC at home to do my creative work where it's quiet, away from ringing telephones," he said.

With the IBM XT, business runs smoothly at the Mariposa Real Estate offices, a fact that makes Jackson quite proud. He summarizes what the IBM PC and XT have done for him—and what they could do for anyone in real estate—in the following ways:

- The machines allow him to train someone else to do the bulk of the company's work. He gets results he wants without having to be there all the time.
- Making changes with a PC is simple, so administrative tasks are carried out with greater speed and accuracy. The PC and XT offer Jackson the opportunity to work more creatively. "There's a great deal of freedom," he says, "in not having to worry about the problems associated with the precomputer days—inserting paper into

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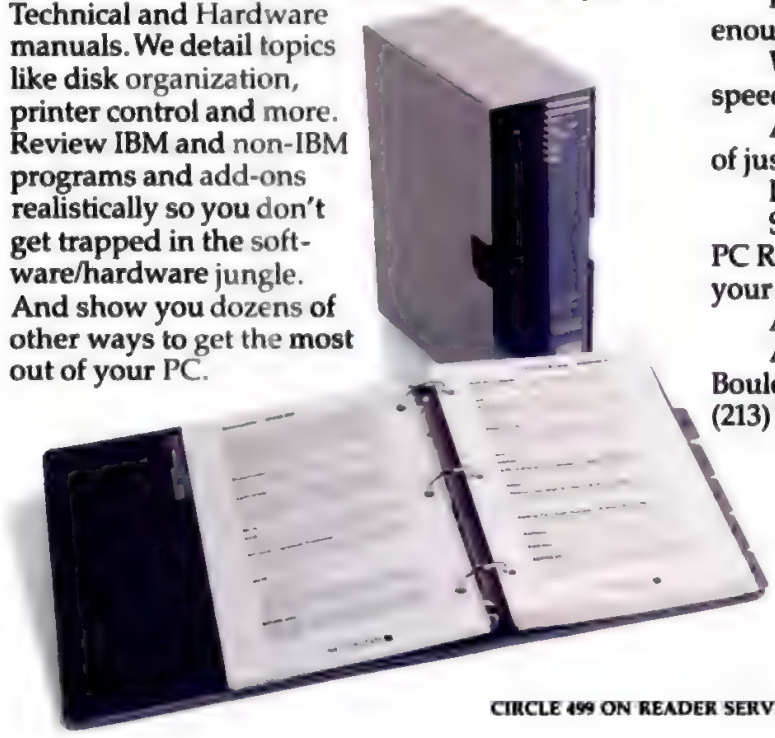
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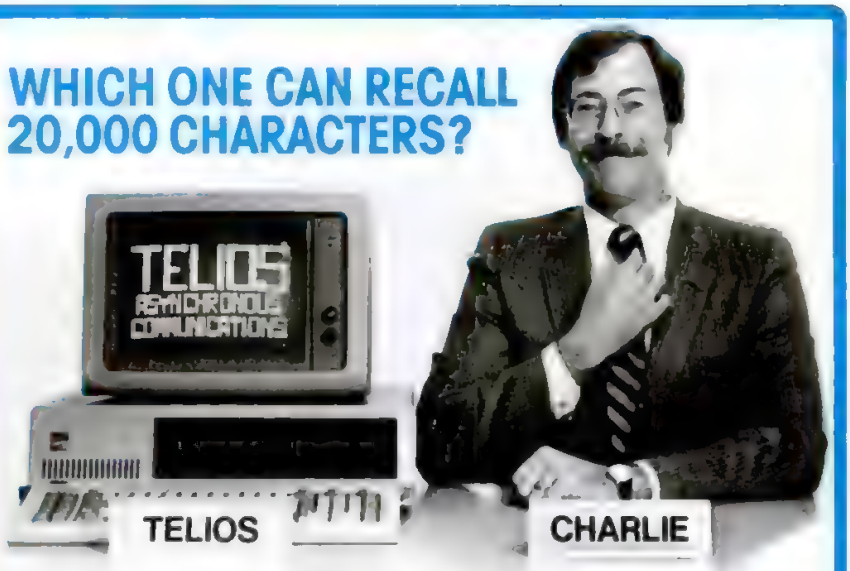
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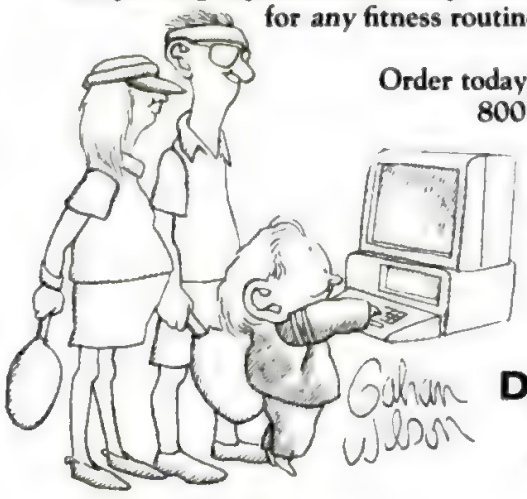
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the typewriter, numbering pages, using white-out, and the like. Now when I work on a project, my time is just about 100 percent productive."

Jackson's reasons for buying the PC and XT are the same as those of many other buyers, and are perhaps the major selling points of the IBM PC. He lists them as: "It has a good operating system, one that just about everyone is trying to be compatible with now. Good programs are available for the PC. Most important, expansion capacity is quite impressive, a significant fact when looking toward future developments."

REALBUG!

The Santa Barbara area's computer use of the IBM PC is rounded out by the Santa Barbara Board of Realtors' Computer User Group, which is called REALBUG!. The term *REALBUG!* stands for REALtor Board User Group. A number of REALBUG! members who own PCs and XTs took advantage of the Board of Realtors' special discount purchase plan. Through this plan, members are eligible for a 10-percent discount on the purchase of systems and supplies. Both the local ComputerLand store and another computer store, Computer Plaza, offer the discounts to board members.

REALBUG! has been such a success that it sometimes meets as often as once a week. Through the group, members learn more about using personal computers in real estate. Featured speakers are brought in to talk about computer-related topics.

The IBM PC has made quite a hit in real estate companies in the Santa Barbara area. Gordon Held, owner of ComputerLand stores in Santa Barbara and in San Luis Obispo, which service a four-county area, has seen the sale of IBM PCs to real estate companies increase as the real estate market has picked up.

"Once other agents in an office see what the IBM PC or XT can do, they want one. The IBM sells itself," Held says.

Held attributes much of the success of the PC and XT in real estate to the name IBM. "The expandability is an important factor, but what impresses people most is that IBM will be here five and ten years from now," he says. Just as an all cash offer with no contingencies and a three-day escrow has always caught the attention of those in real estate, so has the IBM Personal Computer. */PC*



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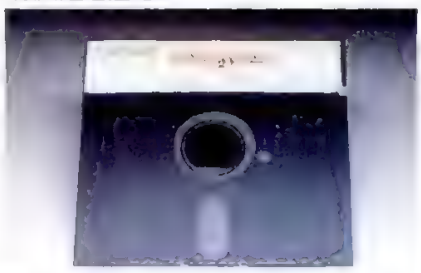
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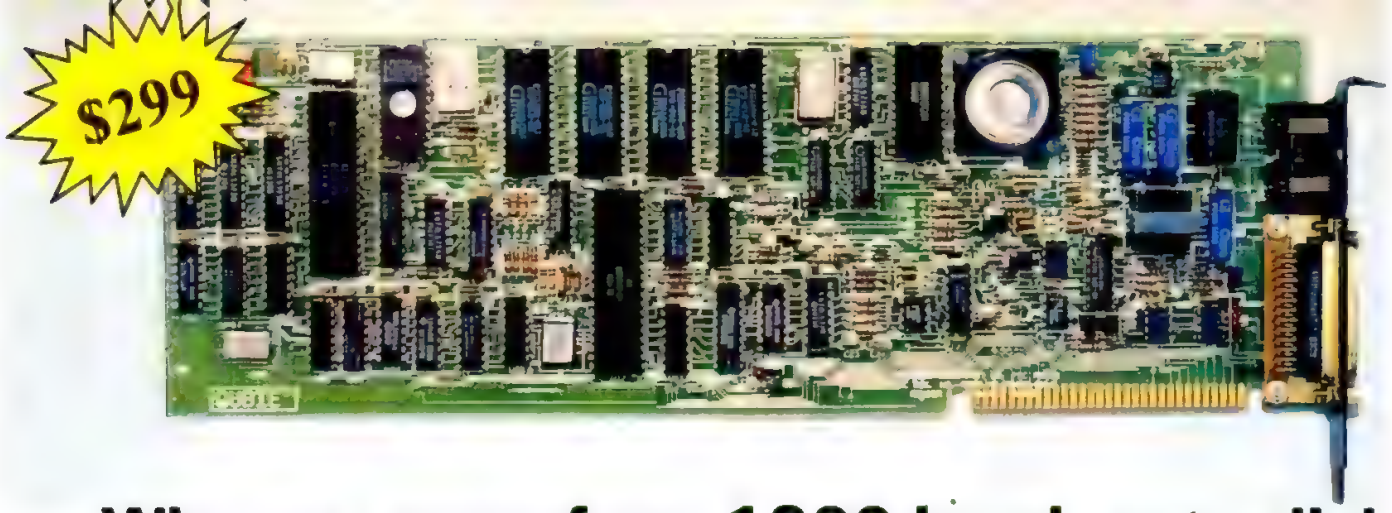
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You can imagine how precise the components had to be to convert tones over a phone line into characters. Precision equates to cost. With the advent of the mass market in personal computers the economics of scale drove the costs of manufacture down but did not effect the precision required. The technology used is called "analog filtering". It is the process of sending (modulating) and receiving (demodulating) tones with perfect pitch. A lot of adjusting, noise suppression, and a little magic is required. Real expensive. Some use lots of chips and filters (known as discrete components). The latest rage is LSI (Large Scale Integration) technology. Which is the same old analog stuff condensed onto fewer chips.

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Our modem is 100% compatible with the Hayes software commands so you can use any of the popular communications packages like CrossTalk, Transend, or PC Modem. We go one better than the competition. We include one of these popular programs with your modem, PC-TALK III. PC WORLD magazine referred to it as "the benchmark that other PC communications packages are measured against." It stores phone numbers, log-on information, handles setting the modems characteristics, saves to disk files, transmits from disk files, even binary files. And to make sure data is sent and received accurately, there is the XMODEM protocol which detects errors caused by poor line quality and retransmits the data.

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THE ACID TEST

Qubie' gives you a 30 day satisfaction guarantee on your modem. If you are not completely satisfied we will refund the entire amount of your purchase including the postage to return it. If you can, get any of our competitors to give you the same guarantee. Buy any modem you like and return the one you don't like. We know which one you will keep.

WHY PAY MORE?

We don't have a clue. It's all here. A high quality, full featured, communications package at a price that used to be reserved for 300 baud modems. But if you decide to spend an extra $200 or $300, we would sure like to hear why. We have spent lots of time thinking about it, and frankly, we just can't come up with a reason.

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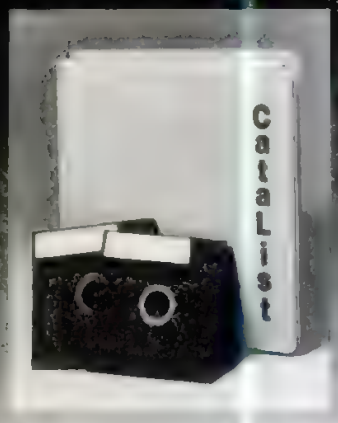
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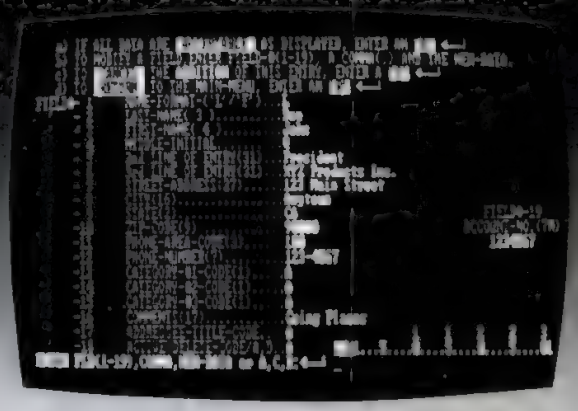
■ COMPUTER SYSTEMS ■

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Due to the rapid automation of library records, you and your PC can now access the collective catalogs of most of the world's major libraries.

Library Automation Reaches Out To The PC

The next time you find yourself in a library, take a good look at the card catalog, because its days are numbered. Some day you might like to tell your grandchildren how you used to track down books in the library.

The present-day card catalog, first introduced in the 1860s, is a remarkable information storage and retrieval device. It provides random access to a large amount of data (over 20 million records in the case of the Library of Congress), handles foreign language character sets, is easy to update, and allows access from a number of points. But the well-worn brass-handled oak drawers are giving way to the newer technology of the microcomputer.

PC owners will soon have access not only to the catalog of the local library but to the collective catalogs of most of the world's major libraries. From your home computer, you will be able to tell whether your local library has an item, if it is in or out on loan, and where it can be found. An inter-library loan system will allow you to order the book to be sent to your local library. Much of this technology is currently in use by librarians and eventually will be extended to individual users.

PC OWNERS will soon have access to the collective catalogs of most of the world's major libraries.

But the first step in the process, automating the library catalog, isn't easy. Imagine, if you will, the following exchange of memos:

MEMO
From: J.Q. Mogul, President
Mogul Industries Incorporated

To: Charlie Programmer

We have just acquired the financially faltering North Southwest State University, and we've made the library a part of the research division. To improve operations, I would like you to write a database system for the new division. An IBM XT will be on your desk tomorrow. Here are the requirements:

- Records can range from 200 to 12,000 characters in length;
- Most fields have to be variable length;
- The system must support character sets for more than 250 languages, some of which read from left to right, some from right to left, some from top to bottom;
- In addition to books and journals, the system must handle photographs, maps, music scores, audio recordings, films, letters, manuscripts, videotapes, computer programs, and data files;
- The system must be able to handle upwards of 10 million records. You'll have to arrange for the retrospective keying of all those that already exist.

I'll check with you in a couple of weeks to see how you are doing.

MEMO
From: C. Programmer
To: J.Q. Mogul

Do we really need Chinese?

Automating the Data

Such a system is just part of what American libraries have achieved over the past 20 years. The history of library automation begins much earlier. Perhaps the single most important element was the development in the early 60s of a standard record format for bibliographic materials—the Library of Congress' Machine Readable Catalog (MARC). The record format description in itself would make a fair-sized book.

The main thrust of the project, under the direction of Henriette Avram, was to provide a means to transfer machine readable records via magnetic tapes to other libraries, enabling them to produce their own catalog cards. In 1967, Frederick Kilgour founded a library cooperative providing access to the machine readable records via a computer terminal. Members either took the existing record, modified it if necessary, and had the cards printed and shipped out to them, or they created a new record that other libraries could use as a cataloging record. This system, known as the Online Computer Library Center (OCLC) has now grown into a nationwide network of over 3,000 participating libraries. The database consists of over 10 million records, and contains the cataloging information in the MARC format. Also, it indicates which of the member libraries holds the work. The OCLC facility, located near Columbus, Ohio, gives the impression of a football field covered with disk drives. The OCLC database claims the distinction of being either the largest or the second largest on the planet, depending on the unknown size of the Central Intelligence Agency and National Security Agency databases.

What started as a cooperative for shared cataloging now has become a large collective catalog of the member libraries. It is a national resource, in that the 10 million records (in the MARC format) include most of the materials in the member libraries. For shared cataloging, it is estimated that about 90 to 95 percent of new acquisitions can be cataloged from records already in the OCLC file. Efforts are now under way to provide subject access to the material, and an inter-library loan system allows member libraries to make requests directly over the network.

More recently, a new library network was created to serve the special needs of the nation's largest research libraries. The Research Libraries Information Network (RLIN) maintains a database with each member library's holdings tagged so that each can maintain its own online catalog within the system. RLIN, after a somewhat rocky start, is now serving a number of major research libraries. Based at Stanford University, the system has over 4 million catalog records. (The Washington Library Network is a similar database system, and the University of Toronto Library Automation System serves Canada.)

SOME libraries have coin-operated PCs, which are used just like the coin-operated copy machines.

Microcomputer Access

Everyone now agrees that the key to the future exploitation of these national bibliographic networks is the microcomputer. The recent selection of the IBM PC as the approved terminal for OCLC assures a prominent place for IBM microcomputers. What remains is providing access to the public. Richard McCoy, the new president of RLIN, said in a recent interview, "Microcomputers are probably the single most important development for us. It will be the demands created by those computers that will have much to do with the way in which the information resources, of which libraries are a part, develop." McCoy added that thousands of individual computers are "breaking down our electronic doors to get at the library databases."

This demand spurred several projects presently underway, most at The University of Michigan, devoted to developing software to interface the IBM PC with the online catalog. The PC user can go directly from the online catalog of the world's libraries to a bibliography, typing hardly a stroke. He even can order online from faraway libraries.

In 1945, a prominent scientist, Vannevar Bush, wrote a Jules Verne-like article in which he boldly predicted the future of data processing and associated technologies. Bush's library of the future resided in a desk drawer. Ultra high-resolution microfilm allowed the entire contents of the world's libraries to be condensed into this small space. Access was provided by devices remarkably like the personal computers of today. Bush called this entire system MEMEX, and librarians have long dreamed of providing users with such a system. Much of what Bush fantasized 40 years ago has become, or is becoming, a reality. We have the small computers, and even the storage devices to handle large masses of data. You and your PC can now access the world's libraries from your desk at home.

Problems and Projects

Unfortunately, the missing link is the ability to access the information by subject. Subject indexing is not much more advanced now than it was in 1945. If one author uses the term "small computer," another uses "microcomputer," and a third uses "personal computer," you can see how confusing subject retrieval can be. As collections grow, this problem grows worse.

While subject access remains the most difficult problem, there are many innovative projects in progress around the country. Northwestern University, Dartmouth College, the University of California, the University of Chicago and the Pike's Peak Public Library District are among the many libraries that have created online catalogs accessible from computer terminals. Harvard recently bought the Northwestern technology. A number of companies have set out to provide services to libraries trying to automate. They will provide hardware, software, consulting and retrospective conversion services. Even the smallest libraries now have the possibility of automating. Every day, new software is appearing that allows libraries to use microcomputers for library functions.

Do You Run Your Business or Does It Run You?

The biggest headache you may be facing these days is getting better control of your business. Tracking unpaid bills, sending out second billings, monitoring which salesman sold how much and to whom, keeping track of inventories, and on and on.

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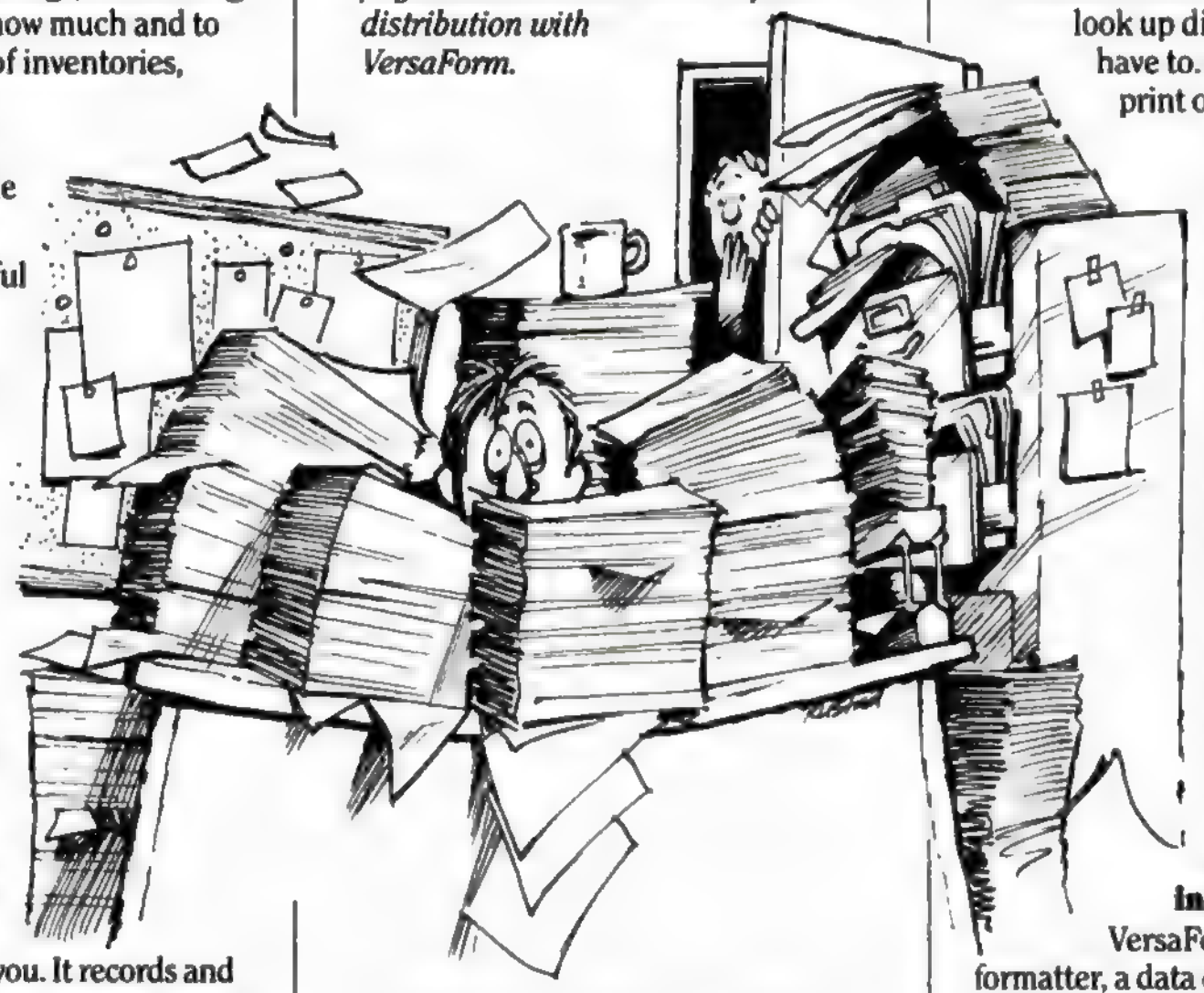
VersaForm starts with your existing forms and procedures. As you copy your forms onto the screen, VersaForm automatically creates a database for you. It records and saves information from Purchase Orders, Invoices, Job Estimates, Disbursement Ledgers…maybe even a few things you're not recording that you should be.

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The computers are used for routine functions, such as circulation, acquisitions, and serials control. In certain cases, computers are provided to patrons. Some libraries have coin-operated PCs, which are used just like the coin-operated copy machines. Other libraries are lending portable computers to patrons just as they do books.

Researchers are constantly looking for new ways to provide library services. One of the more interesting projects is a joint effort between the Library of Congress and RLIN to automate the entry of Korean, Japanese and Chinese materials. Yes, Charlie, we really do need Chinese.

The biggest problem in this scenario is money. Libraries and networks are strapped for cash and are finding the enormous sums needed for automation difficult to extract from government or private foundations. Increasingly, the user is asked to foot part of the bill. This is a serious threat to the long tradition of free library service, which has prevailed so long in this country. The problem prompted the governor of California to suggest a subsidy to library users to pay for these costly services. It is difficult to predict what the outcome will be, but many librarians are concerned, as are educators, that the new technologies will create a class structure of the information rich and the information poor. In all likelihood, the financial and social problems will prove more difficult to solve than the technological ones. /PC

LIBRARIES are finding the enormous sums needed for automation difficult to extract from government or private foundations.

Victor Rosenberg, Associate Professor of Library Science at The University of Michigan, is president of Personal Bibliographic Software, Inc. in Ann Arbor, Michigan.

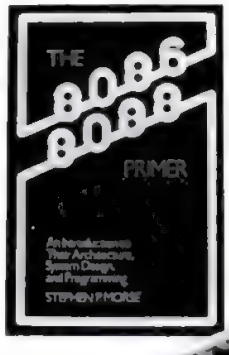
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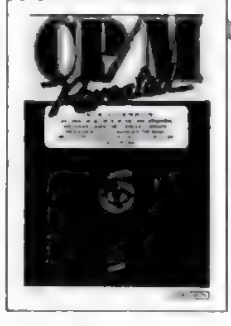
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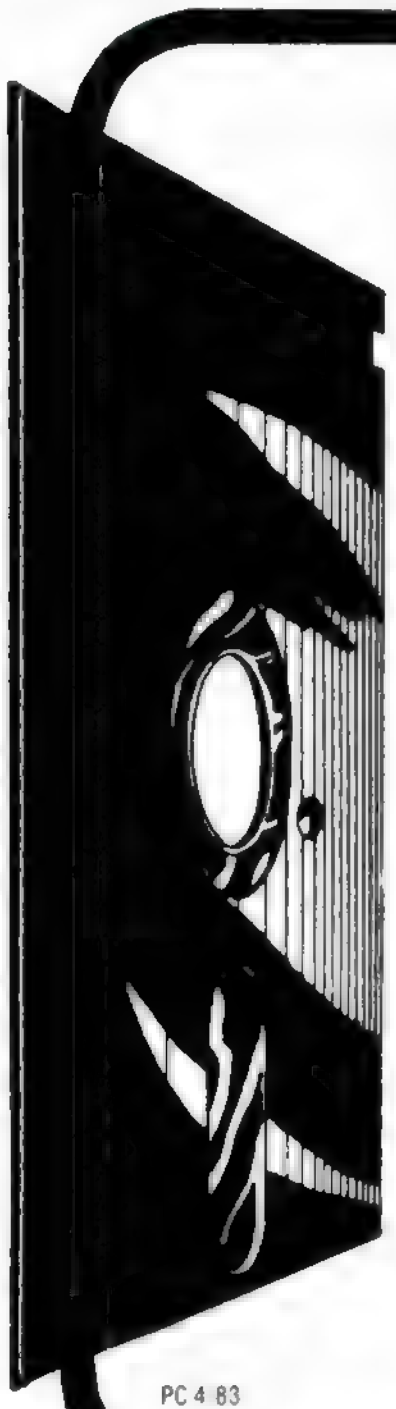
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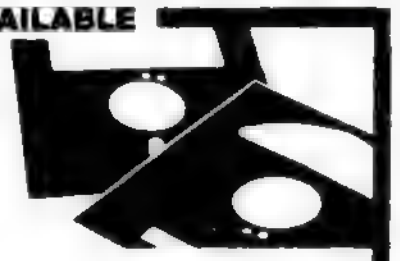
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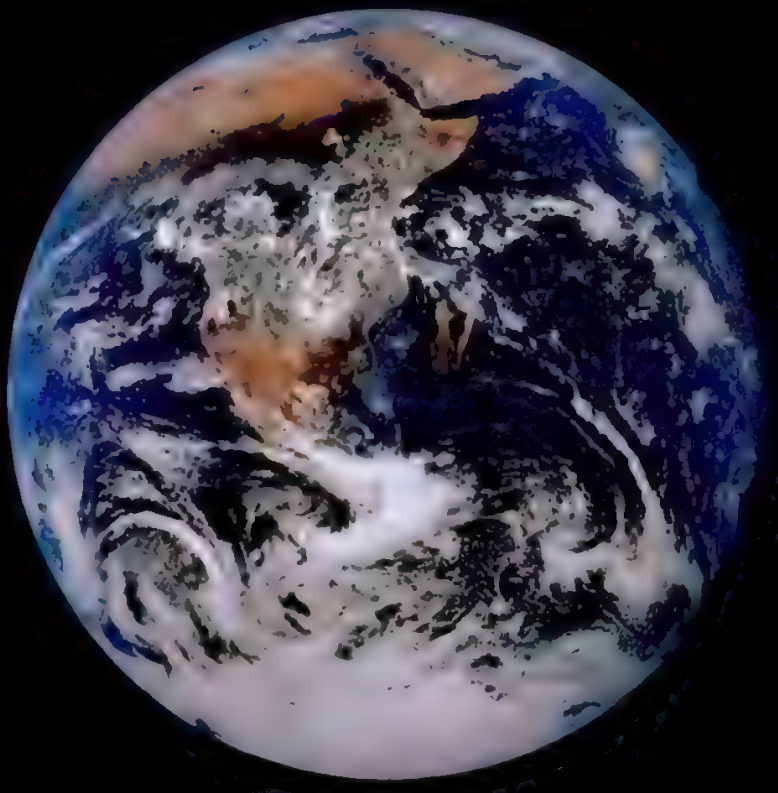
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SOFTWARE/RICHARD A. WALKER AND CHRIS SHERMAN

If you have avoided buying educational software for fear of owning a "lemon," don't despair. The following article will help you select the best programs from the available crop.

Evaluating Educational Software

Using a computer to assist in the learning process is a logical and appealing concept. Although Computer-Assisted Instruction (CAI) is not new, the growing availability of microcomputers has created an increased demand for educational software, or "courseware." This demand is being met by a rapidly growing industry with the sole purpose of providing educational software for microcomputers.

As with all new endeavors, microcomputer courseware development is experiencing growing pains. While standards for quality courseware are becoming more refined, the body of existing courseware consists of badly designed programs that are little more than drill-and-practice routines. As educational tools, these have proved disappointing, partly because they force the learner to follow a fixed path. Studies conducted by Dr. H. J. Becker, of the National Institute of Education, show that 35 percent of teachers who initially purchase drill-and-practice software use it significantly less than they had anticipated.

Good courseware *is* available, however. A fundamental rule of all good courseware is that it is highly interactive, enabling the learner to change the flow of the lesson to meet his or her individual needs. (Poorly designed courseware often is reactive, meaning that the learner simply responds to a prompt provided by the computer.) Quality courseware takes advantage of its computerized medium and is designed from the ground up. Content first is given careful consideration. Scientifically derived instructional design techniques are then utilized to place control of the lesson largely in the hands of the learner.

Perceiving Levels

When evaluating courseware, the first step is to determine how the lesson is designed. Certain learning activities demand much more flexibility from a lesson design than others. For example, a lesson designed to teach spelling does not need to be as flexible as one designed to teach analogies, or one that compares two dissimilar concepts, such as the sonnet and the limerick forms of poetry.

In essence, there are three levels of lesson design: (1) instructional games; (2) schoolwork-related courseware; (3) courseware that teaches analytical or practical skills. These categories are not rigid and sometimes may overlap.

For children who have never used a computer before, games serve as a good introduction to the PC and provide an easy transition to the concept of using the computer for learning. Level-one instructional games allow children to become comfortable with the computer and teach them to respect its capabilities. The lessons utilize many features found in video games, and yet they are learning-oriented. *Facemaker*, by Spinnaker Software, is a good example of this type of program.

Once a child has realized that learning with the computer can be fun, second-level courseware can help with schoolwork. If you are a parent evaluating second-level courseware, your primary concern should be the program's relevance to your child's schoolwork. This requires some effort on your part to make a good match between your child's curriculum in school and the courseware you buy.

Lesson Design

Once you have decided that a level-two lesson is appropriate, take a closer look at its design. Is it a drill-and-practice lesson, or a more sophisticated tutoring package that encourages a higher degree of interaction? *Fact-Track*, by SRA, is a good example of a drill-and-practice lesson. The learner selects the level of difficulty and then performs a timed exercise testing basic math skills. When the exercise is over, the child is told how many problems were answered correctly and is shown problems that were missed. *SpeedReader*, by Davidson and Associates, is a more sophisticated level-two lesson designed to systematically present instruction on how to increase reading speed and comprehension.

While third-level courseware is designed to teach analytical skills, such as problem-solving techniques or even computer programming, it also can help sharpen practical skills. For example, teaching a child to write with a word-processor can alleviate such traditional frustrations as poor penmanship and poor spelling, and the interactive editing capability of a word-processor can enhance both writing and typing skills. In this example, the users also learn to apply the computer in their daily lives. Many educators feel this is the true definition of computer literacy.

Problem-solving techniques taught with third-level courseware do not always involve right and wrong answers. A child often learns that finding the solution to a problem involves the concept of "debugging," a valuable analytical skill that can be applied to almost any activity where a creative solution is required.

Evaluation Guidelines

Five tests can be applied to a courseware program to help you evaluate its quality. (A basic evaluation scheme for courseware was discussed in two previous articles. See "Educational Software for the PC," *PC*, Volume 1 Number 8; and "The Blossoming of Computer Aided Instruction," *PC*, Volume 1 Number 12.) The five tests are:

- Effectiveness: How well does it teach?
- Efficiency: How easy is it to use?
- Documentation: How good are the instructions?
- Appeal: Is it fun to use?
- Use of the computer: Does it maximize the unique capabilities of the computer?

These five criteria should be used during all phases of your evaluation process, whether you are looking at a demonstration program, studying product documentation, or simply reading an advertisement. See Figure 1 for an evaluation format and checklist.

Effectiveness and Efficiency

Effective courseware not only teaches the correct way of doing things, but also provides feedback to the user in practice sessions. This feedback should reinforce correct answers to questions and describe the correct solutions to problems answered incorrectly. An option for extended review should also be available.

IT'S EASY to judge a lesson's efficiency if you can get a hands-on demo.

Effective second- or third-level courseware should begin with a presentation of the core idea or problem. This should be clearly explained and applications or solutions illustrated with examples. The user then proceeds to practice exercises.

Ideally, the learner should be able to move at will through the various portions of a lesson. If the learner feels comfortable with the material and wants to go immediately into a practice situation, he or she should not have to sit through the presentation of the core idea or the examples. Also, access to a help function should be available at any point in the lesson.

Lesson design plays a major role in determining lesson effectiveness. As a general rule, the more flexibility allowed to a learner, the more effective the lesson will be. However, a well designed lesson must have content of equal quality if the courseware is to be truly effective.

It's easy to judge a lesson's efficiency if you can get a hands-on demo. These are

Figure 1: The courseware evaluation checklist.

INSTRUCTIONAL EFFECTIVENESS
- Core ideas are clearly defined: ____
- Learner can choose his own path through the lesson: ____
- Knowledge of results is provided during practice: ____
- Positive feedback to correct responses: ____
- Help is available on demand: ____

EFFICIENCY
- No lesson programming errors: ____
- Lesson flows smoothly and is easy to use: ____
- Lesson is well planned and organized: ____

DOCUMENTATION
- Learning objectives are clearly stated: ____
- Intended age level is described: ____
- Minimum computer requirements are listed: ____
- Complete first-time user instructions are included: ____
- User telephone hotline available: ____

APPEAL
- Lesson concept is appealing: ____
- Multiple use without boredom or repetition: ____
- Packaging is well-designed and attractive: ____

USE OF THE COMPUTER
- Use of color: ____
- Use of sound: ____
- Use of function keys: ____
- Program executes quickly: ____
- Good programming techniques: ____

some of the factors you should consider: Does the lesson run without programming errors? Does the program require many prerequisite skills? Can the learner move easily from display to display, unit to unit, or lesson to lesson? Does the lesson flow smoothly? Can users skip over portions that are irrelevant to them, or must they sit through the entire lesson to get to the parts that interest them?

Documentation and Appeal

If you can't get a hands-on demonstration, the lesson's instruction manual should give many answers to these questions. The documentation should tell you everything you need to know about the lesson, including the learning objectives, the intended grade level, and whether or not the program is flexible. It also should discuss the lesson design: Is it drill and practice, or is it a more sophisticated design? The minimum PC configuration required to run the program should be explicitly stated. Step-by-step instructions detailing how to use the lesson for the first time are extremely important.

GOOD courseware takes advantage of the features of the PC.

The documentation by itself should help you decide whether or not to buy the courseware. If the documentation is well-written, clear, and easy to use, chances are that the courseware will be equally good.

The appeal of courseware must be judged by your personal standards. Some of the questions you might ask include: Is the concept of the courseware attractive? Is it something that will hold a child's attention? Is the program well designed and appealing enough to be used more than once? Some courseware allows a learner to take a unique path each time through the lesson, which means a child can learn math, or science, or spelling without boring repetition. This is one of the major advantages courseware has over more traditional, less interactive media, such as books and films.

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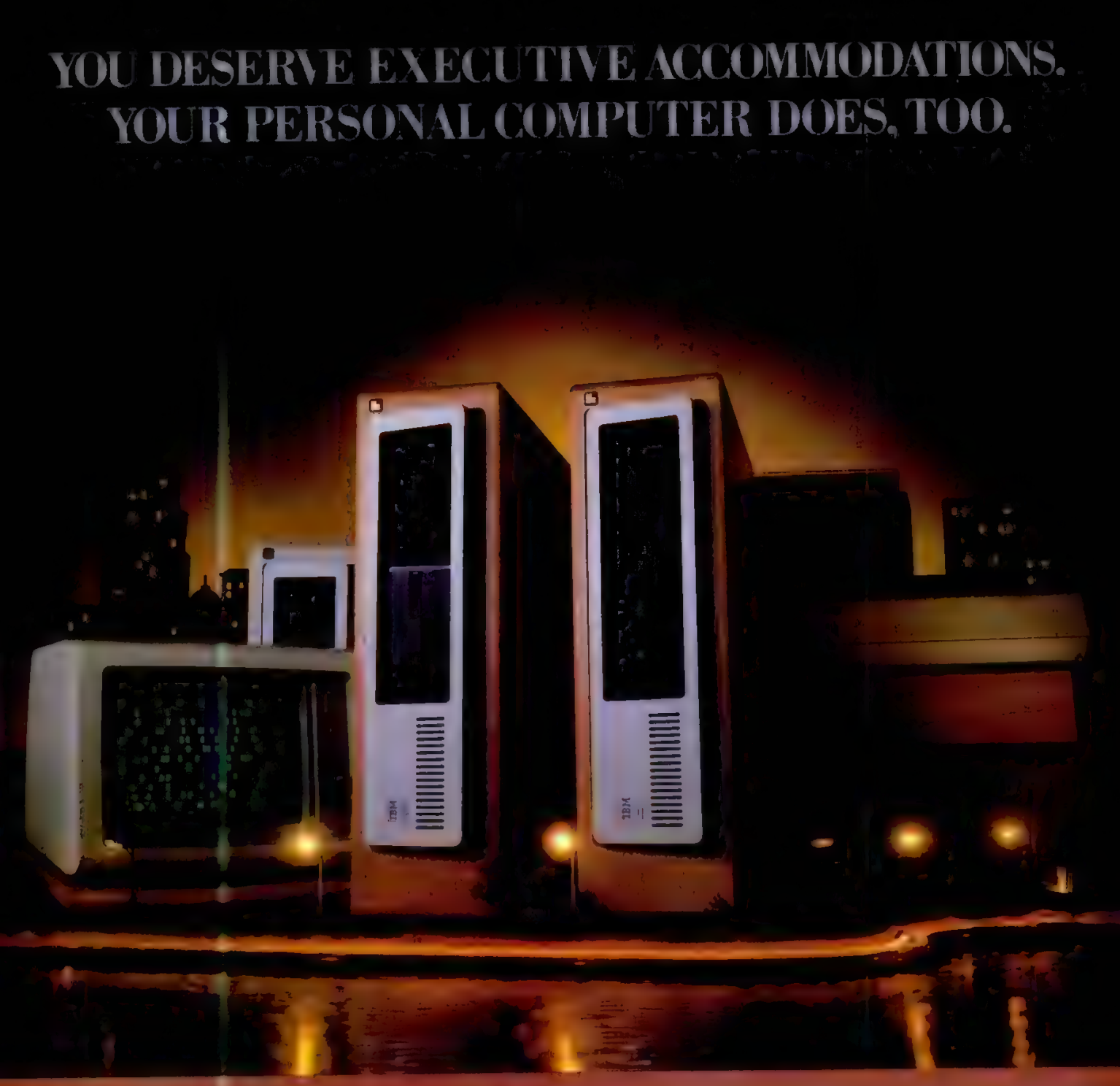
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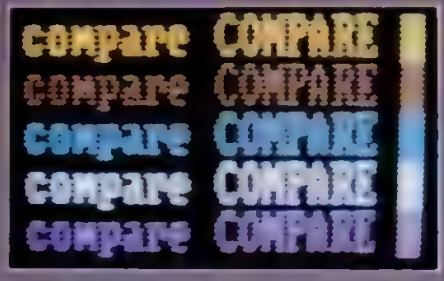
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The packaging of the lesson ought to be appealing as well, since it often reflects how much time and concern went into the overall design of the product.

Good courseware takes advantage of the function keys, color, graphics, sound, and other features of the PC. The documentation should indicate whether these features are used. If you get a hands-on demo, play with the keys to see if they take

EXPLORING hands on the keys should not cause a program to fail.

advantage of the PC, or if they cause potential problems. What happens if you hit a key at random or deliberately hit an incorrect key? The program should be able to handle errors like this. Children are curious; exploring hands on the keys should not cause a program to fail. Otherwise, the child may give up on the program in frustration.

Watch out for lengthy pauses when something is loaded into memory from disk. Are transitions logical and smooth? Use your intuition here; if a lesson makes no sense to you, imagine how it will appear to a child trying to use the program!

Some excellent programs can handle two or more learners at once, or allow a learner to leave the lesson and then pick it up again at the same point. These features help assure that the lesson will be used more than once.

A Promising Trend

Courseware development is a young industry. Given the short span of its existence, it is remarkable how much is available for microcomputers. Although the quality of courseware packages varies, there is a trend toward better, more consistent lessons. In the future, courseware will become an integral component of all personal computer systems. */PC*

Dr. Richard A. Walker is president of Interactive Technologies Corporation, a San Diego firm that develops microcomputer and laser videodisk courseware. Chris Sherman is an instructional designer at the same firm.

Educational Software

A list of some of the educational software titles currently on the market, including product information and descriptions.

Alphabet Zoo
Spinnaker Software
215 First St.
Cambridge, MA 02142
(617) 868-4700
Price: $29.95
Requires: 64K RAM, one disk drive, color graphics adapter.
Age Group: 3 to 8 years
Description: Two games that teach the relationship between sounds and letters, and sharpen skills.

CIRCLE 687 ON READER SERVICE CARD

Computer Discovery
Science Research Associates, Inc.
155 N. Wacker Dr.
Chicago, IL 60606
(312) 984-7000
Price: $200 program, $49.95 workbooks, $7.50 teacher's manual
Requires: 64K RAM, one disk drive, color graphics adapter
Age Group: Grade 7, and up
Description: Introduction to the computer, both operation and programming, and social issues.

CIRCLE 692 ON READER SERVICE CARD

Creature Creator
DesignWare
185 Berry St.
San Francisco, CA 94107
(800) 572-7767, (415) 546-1866
Price: $39.95
Requires: 64K RAM, one disk drive, color graphics adapter.
Age Group: 4 to 8
Description: Teaches the fundamentals of computer use by allowing children to create creatures and animate them to make them dance.

CIRCLE 663 ON READER SERVICE CARD

Cross Clues
Science Research Associates, Inc.
155 N. Wacker Dr.
Chicago, IL 60606
(312) 984-7000
Price: $35.00
Requires: 64K RAM, one disk drive.
Age Group: Grade 7, and up
Description: A word game that calls on vocabulary, spelling, and word structure skills. For two players.

CIRCLE 688 ON READER SERVICE CARD

CryptoCube
DesignWare
185 Berry St.
San Francisco, CA 94107
(800) 572-7767, (415) 546-1866
Price: $39.95
Requires: 64K RAM, one disk drive, color graphics adapter.
Age Group: 8 to adult
Description: Word-puzzle game, allows you to create your own puzzles.

CIRCLE 664 ON READER SERVICE CARD

Delta Drawing
Spinnaker Software
215 First St.
Cambridge, MA 02142
(617) 868-4700
Price: $49.95
Requires: 64K RAM, one disk drive, color graphics adapter.
Age Group: 4 to adult
Description: Children can create graphics on the screen using single key commands to control the cursor.

CIRCLE 681 ON READER SERVICE CARD

FaceMaker
Spinnaker Software
215 First St.
Cambridge, MA 02142
(617) 868-4700
Price: $34.95
Requires: 64K RAM, one disk drive, color graphics adapter.
Age Group: 4 to 12 years
Description: The child creates a face and then animates the parts. Then the computer animates the parts and the child must match the movements.

CIRCLE 684 ON READER SERVICE CARD

Fact Track
Science Research Associates, Inc.
155 N. Wacker Dr.
Chicago, IL 60606
(312) 984-7000
Price: $100
Requires: 64K RAM, one disk drive, color graphics adapter.
Age Group: Grades 1 to 6
Description: Timed drill and practice on mathematics facts.

CIRCLE 691 ON READER SERVICE CARD

Free Enterprise
Science Research Associates, Inc.
155 N. Wacker Dr.
Chicago, IL 60606
(312) 984-7000
Price: $100
Requires: 64K RAM, one disk drive, color graphics adapter, printer strongly recommended
Age Group: Grade 9, and up
Description: Players in this decision-making simulation delve into strategies for winning at business.

CIRCLE 689 ON READER SERVICE CARD

Green Screen Stories
D.M. Studio
3400 Medina Lane
Bowie, MD 20715
Price: $20
Requires: 64K RAM, one disk drive, BASICA
Age Group: 8 to 12
Description: Reading lessons from classical mythology and original tales.

CIRCLE 669 ON READER SERVICE CARD

Hey Diddle Diddle
Spinnaker Software
215 First St.
Cambridge, MA 02142
(617) 868-4700
Price: $29.95
Requires: 64K RAM, one disk drive, color graphics adapter
Age Group: 3 to 10 years
Description: Three-part learning game that introduces a child to traditional Mother Goose lore.

CIRCLE 685 ON READER SERVICE CARD

In Search of the Most Amazing Thing
Spinnaker Software
215 First Street
Cambridge, MA 02142
(617) 868-4700
Price: $39.95
Requires: 64K RAM, one disk drive, color graphics adapter
Age Group: 10 to adult
Description: The child solves an adventure, changing clues for the next game.

CIRCLE 680 ON READER SERVICE CARD

Karel the Robot: A Gentle Introduction to the Art of Programming
Cybertronics International, Inc.
999 Mount Kemble Ave.
Morristown, NJ 07960
(212) 532-3089
Price: $242 for package, $7 for textbook, $85 for Karel Simulator, $150 for course disks
Requires: 64K RAM, with Pascal
Age Group: 5th grade, and up
Description: Students create programs that allow Karel to travel through his world.

CIRCLE 666 ON READER SERVICE CARD

Kindercomp
Spinnaker Software
215 First St.
Cambridge, MA 02142
(617) 868-4700
Price: $29.95
Requires: 64K RAM, one disk drive, color graphics adapter
Age Group: 3 to 8 years
Description: Learning games prepare a child to read, spell, and count.

CIRCLE 686 ON READER SERVICE CARD

MasterType
Lightning Software
P.O. Box 11725
Palo Alto, CA 94306
(415) 327-3280
Price: $49.95
Requires: 64K RAM, one disk drive
Age Group: 10, and up
Description: Instructional game that teaches typing skills.

CIRCLE 662 ON READER SERVICE CARD

Math Drills—I
Starware
1701 K Street NW
Suite 801
Washington, DC 20006
(202) 331-8833
Price: $25
Requires: 64K RAM, one disk drive, color graphics adapter
Age Group: 6 to 16
Description: Drill and practice routines with arithmetic.

CIRCLE 673 ON READER SERVICE CARD

Mathletics
ABS Software
P.O. Box 309
Blue Bell, PA 19422
(215) 277-0304
Price: $20
Requires: 64K RAM, one disk drive
Age Group: 5 to 17
Description: Drill and practice in basic math operations. Child determines level of drill difficulty.

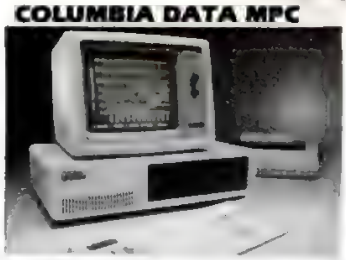
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Science Research Associates, Inc.
155 N. Wacker Dr.
Chicago, IL 60606
(312) 984-7000
Price: $200 program, $49.95 workbooks, $10 teacher's manual
Requires: 64K RAM, one disk drive, color graphics adapter
Age Group: Grades 4 to 8
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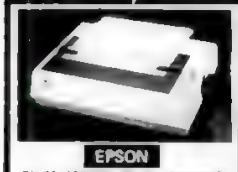
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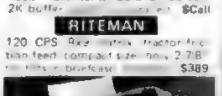
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IDS Prism 80C, 200 CPS, 80 col.; 4 color graphics, friction, tractor feed, sheet feeder, parallel $1,259
IDS Prism 132C, above but 132 co[illegible] Parallel $1,495

TOSHIBA

Super dot matrix [illegible] w/ 24-pin hi-resolution head, 192 CPS draft, 130 CPS [illegible] Call
[illegible] 2410P, 350 CPS, 136 co[illegible] friction & tractor, 24-pin, parallel $2,295



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Letter quality daisywheel printer, 16 CPS, bi-directional, tractor feed, parallel interface. Super value $685
Serial interface $749
Tractor $119

DAISYWRITER 2000

The [illegible] with [illegible] w/ 48K buffer, [illegible] 17 CPS, bi-directional, [illegible] [illegible] universal interface $1,195
Tractor $119

DYNAX DX-15

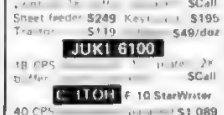
[illegible] 13 CPS, [illegible] [illegible] $Call
Sheet feeder $249 Key[illegible] $195
Tractor $119 [illegible] $49/doz

JUKI 6100

18 CPS, [illegible] 2K buffer [illegible] $Call

C. ITOH F-10 StarWriter

40 CPS, [illegible] parallel $1,089
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[illegible] $225



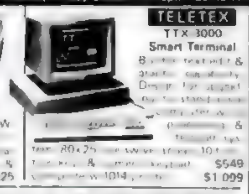
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ML-93S, above but serial $969
2410P, 350 CPS, 136 col., friction & tractor, 24-pin, parallel $2,295



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NEW [illegible] w/ memory, [illegible] w/ [illegible] 2-14 [illegible] & [illegible] w/ [illegible] [illegible] $625



TELETEX

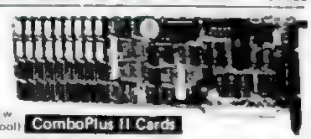
TTX-3000 Smart Terminal

8-slot [illegible] & [illegible] card, [illegible] Dmap for [illegible] [illegible] 80x25 [illegible] [illegible] & [illegible] w/ 1014 [illegible] $549 $1,099

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w/ Parallel, Serial ports & clock	$288	$338	$388	$438	$488	$538

[illegible] add $35

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w/ either parallel or asynch serial port No. 2	$314	$364	$414	$464
w/ both parallel and asynch serial port No. 2	$349	$399	$449	$499

MegaPak [illegible] expands a fully [illegible] to 512k $299

I/O Plus II Cards

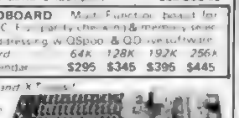
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Additional Parallel (P), Game (G), or Serial 2 (S2) port add $35 ea

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[illegible] Turbo[illegible] your IBM PC and XT [illegible]

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AddRam Elite (parallel & serial ports. Memory installed	64K	128K	192K	256K	320K	384K	448K	512K
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AddRam Plus (Two serial ports!)



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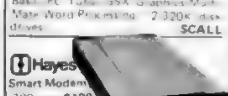
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Dynax AM-121, 12" amber 800 dot, 20 MHz List $250 $149
Taxan KA-12N, 12" amber 800 dot, List $205.00 $150.00
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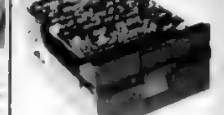
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1200 $499
1200B $459



A 64K IBM PC System [illegible] 320K drives, monochrome graphics card $Call
B 64K IBM PC System [illegible] 20K drives, monochrome display, [illegible] 4 [illegible] $Call

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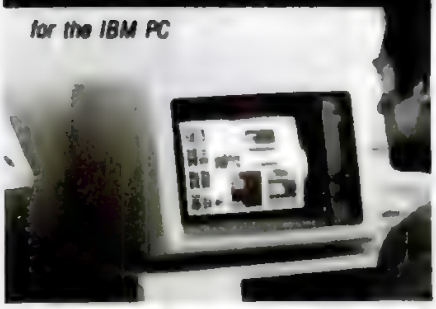
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STONE Software Marketing
7910 Ivanhoe Ave. Suite 319
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Alpha Software Corp.
12 New England Executive Park
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(617) 229-2924
Price: $45
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Age Group: 8 to 18
Description: The learner thinks of an item from listed topics, and the computer tries to guess the answer by asking questions.

CIRCLE 675 ON READER SERVICE CARD

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Pace Educational Software
7121 Quincy Ave.
Falls Church, VA 22042
(703) 573-0736
Price: $24 each module
Requires: 64K RAM, one disk drive, color graphics card
Age Group: 4 years to 4th grade
Description: This series consists of 4 progressive reading lessons. Extensive use of graphics, animation and sound.

CIRCLE 670 ON READER SERVICE CARD

Rhymes and Riddles
Spinnaker Software
215 First St.
Cambridge, MA 02142
(617) 868-4700
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Age Group: 5 to 9 years
Description: A letter-guessing game presented in three formats: nursery rhymes, riddles, famous sayings.

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Spinnaker Software
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Price: $44.95
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Age Group: 10 to adult
Description: Players are detectives trying to determine who perpetrated the crime and what the motive was.

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Davidson and Associates
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Description: *Speed Reader* teaches students to read faster and with greater comprehension.

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SpellBound
Davell Custom Software
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Age Group: 10, and up
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DesignWare
185 Berry St.
San Francisco, CA 94107
(800) 572-7767, (415) 546-1866
Price: $39.95
Requires: 64K RAM, one disk drive, color graphics adapter
Age Group: 1st grade to adult
Description: Action spelling game.

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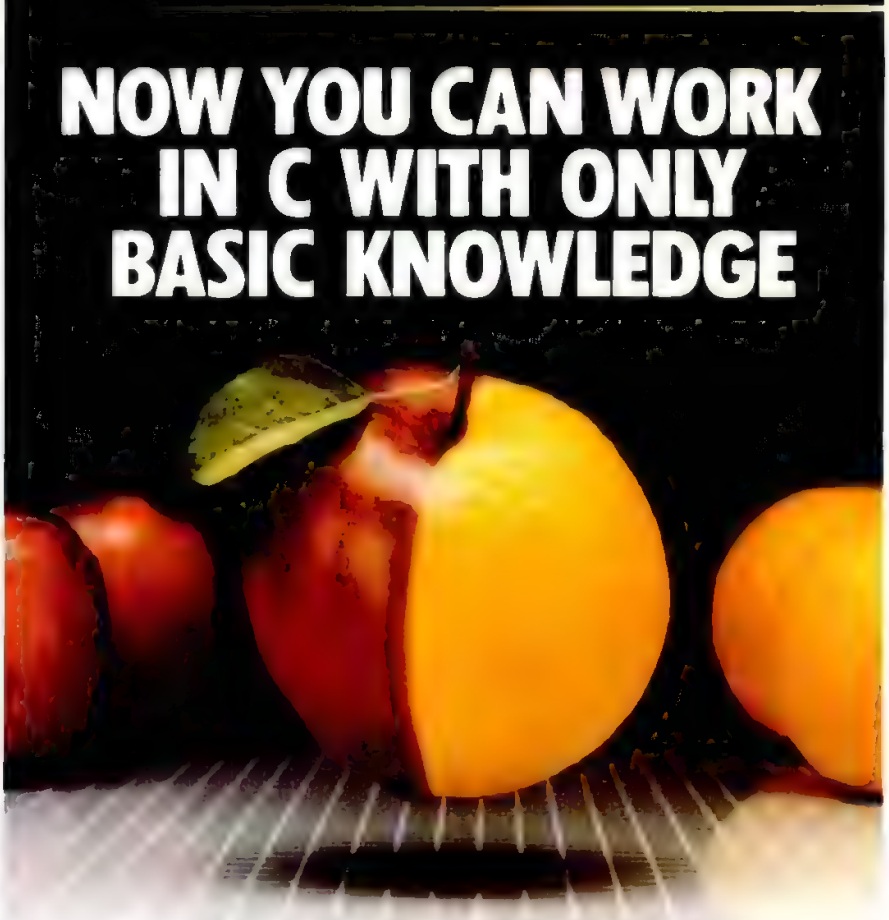
States and Capitals
The Software Guide
18 Oak Tree Lane
Little Falls, NJ 07424
Price: $24.95
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Systems Products Division
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Boca Raton, FL 33432
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Age Group: 16 to adult
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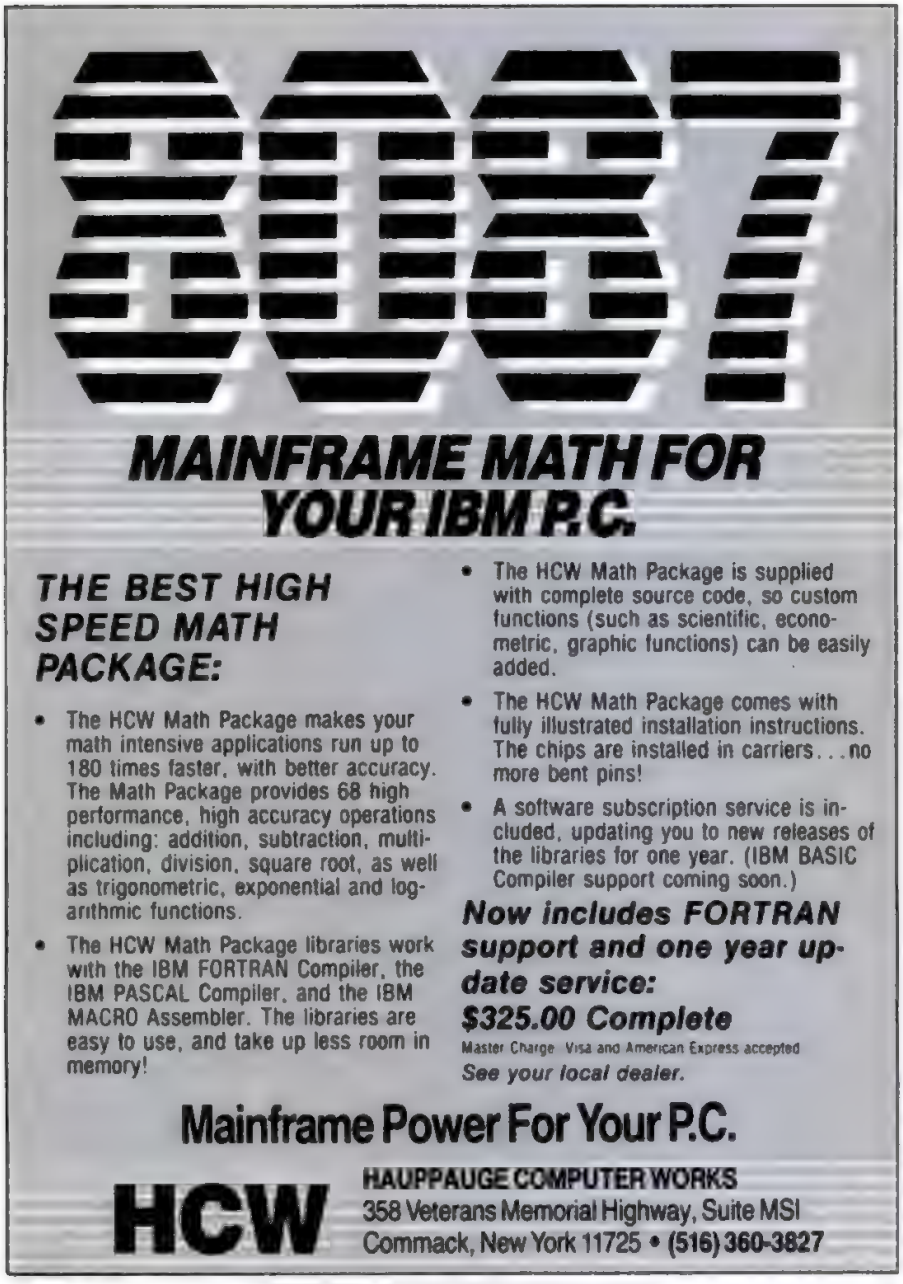
Word Challenge
Proximity Devices Corporation
3511 N.E. 22nd Ave.
Ft. Lauderdale, FL 33308
(305) 566-3511
Price: $39.95
Requires: 64K RAM, one disk drive
Age Group: 10 to adult
Description: *Word Challenge* is a spelling game, asking the learner to find as many words as possible in a square with 9, 16, or 25 boxes.

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Description: Vocabulary practice, emphasizing synonyms, definitions, antonyms, and analogies.

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—R.W. and C.S.

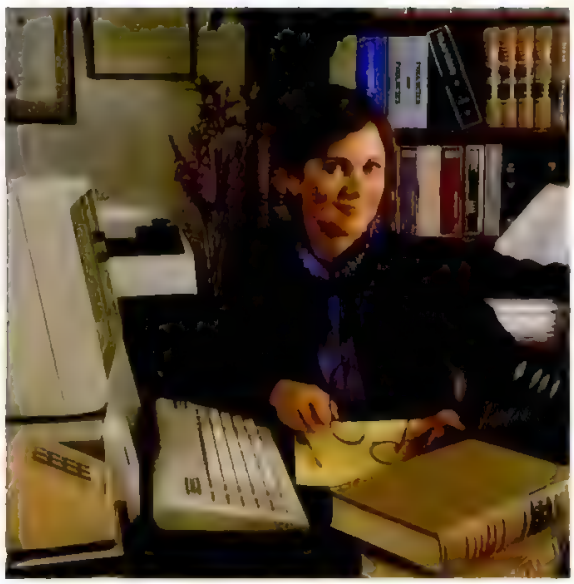


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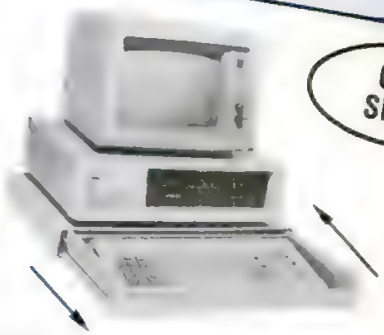
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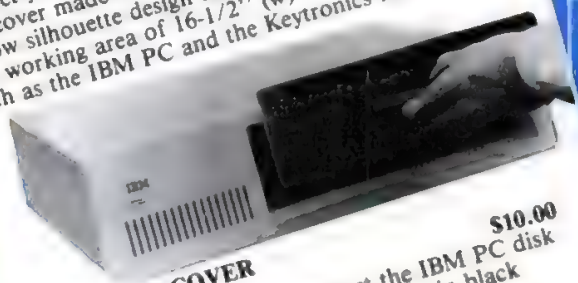


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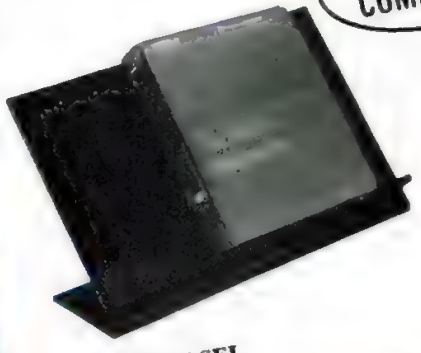
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CIRCLE 366 ON READER SERVICE CARD



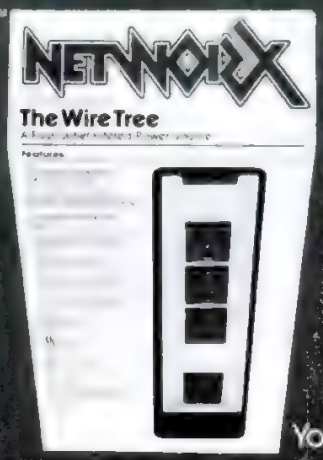
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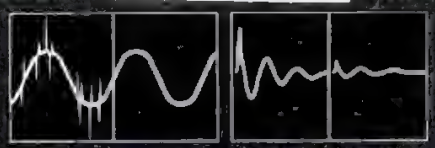
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CIRCLE 396 ON READER SERVICE CARD



Illustration: Elwood Smith



SOFTWARE/ERIC FREEDMAN

Genealogical charts, along with notes on your family's past, can be stored and manipulated with this software package.

Family Roots Puts A Cursor On Your Precursors

The television miniseries "Roots," based on Alex Haley's best-seller of the same title, kindled a widespread interest in ancestries. Rootsmania spurred countless genealogical hunting expeditions, interviews with family elders, and courses in local and family history.

For many, exploring their roots meant days devoted to reading microfilm newspapers and census records; scouring dusty county history books; writing to military, religious, and government organizations across the country; and tramping through overgrown cemeteries trying to decipher weathered inscriptions on moss-encrusted tombstones. There was a mystique about the quest, a feeling that important clues to one's own self were waiting. These were real mysteries to solve, and heroes, rogues, and just plain folks to find.

Whatever the motives—romantic or practical—the result of all that searching was the creation of notebooks and yellow pads filled with names, dates, places, occupations, and relationships. That's where *Family Roots* and the IBM Personal Computer come in.

Family Roots is an amazingly versatile program designed to manipulate, cross-reference, and display data. If you have single-sided drives, the package comes with two disks, one with main programs and the other with auxiliary programs. All the programs are available on a single disk for double-sided drives.

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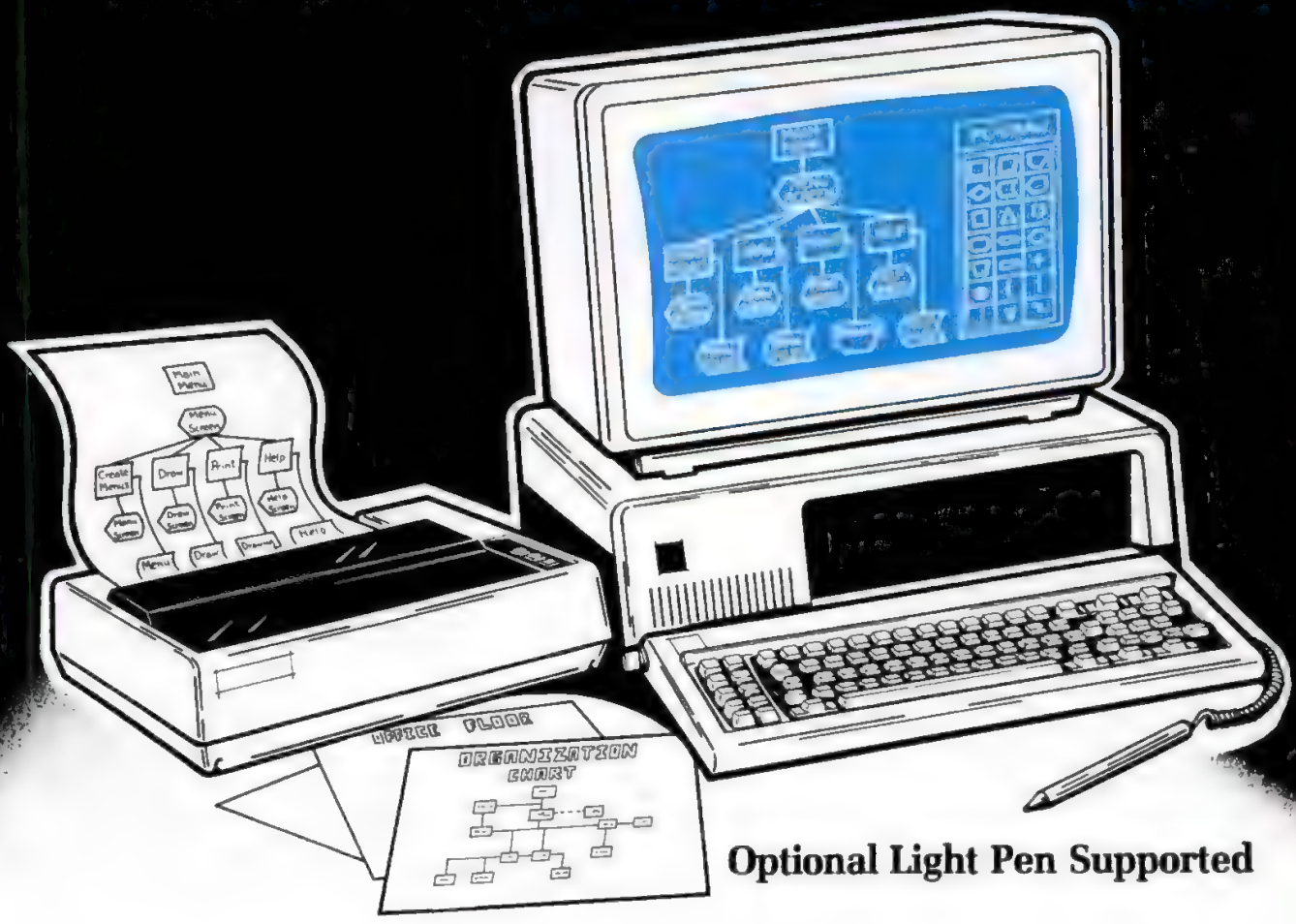
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CIRCLE 158 ON READER SERVICE CARD

binder: it includes a 5-page section near the end devoted to some common problems and a short appendix explaining the few special characters you'll need to learn. The manual contains an ample number of figures and tables to explain the narrative. Written in conversational style, the documentation is generally easy to follow. The user is guided through each step: from putting DOS files onto the program diskette and configuring hardware, through developing genealogical charts, to printing a mailing list with addresses of living relatives.

Adding to the program's flexibility is its ability to change parameters for each program. When printing charts, for example, you can control print size, decide whether to use names or numbers to label months, choose whether a woman's married name or maiden name will appear, and more. In printing out information for an individual or a family group, you can decide to arrange children by birth date, choose between having first names or last names appear first, and pretty well customize the printout to meet individual needs.

Family Roots provides six major programs and seven utilities, all accessed through a main menu with 13 options (see Figure 1). Starting with the data entry program EDIT, you can develop individual records (see Figure 2). At this point, the program (as it now exists) requires you to take an annoying extra step. To create a record, you first must enter the subject's name. However, before you can enter the date of birth and other information, you have to go back to the main menu and punch up the name you had just entered.

BEFORE YOU can enter the date of birth, you have to go back to the main menu and punch up the name you have just entered.

I also ran into a bug with the version of the program used for this review. After entering my 75th record, I got an error message and couldn't add the 76th; I had to go to the 101st, thereby losing space for 75 records. There should be room for about 550 records on a double-sided double-density diskette. *Family Roots'* author Stephen C. Vorenberg said he's received similar complaints of error messages occurring after a multiple of 25 is reached; the program stores records in groups of 25. Vorenberg said the problem has been corrected in an updated version of the program. Registered owners of the earlier version will be notified by the manufacturer, Quinsept, Inc., of the availability of a new diskette with a "fixer" utility. Upon notification of a problem, Quinsept will send the new diskette to these users.

Setting the Tables

The standard record fields—date and place of birth, death, marriage, parents, and children—can be supplemented with up to nine user-defined fields. I added occupation, place of burial, college, and sex. The last category may seem unnecessary, but users may run into ancestors and relatives with names that are ambiguous as to gender—for instance, I came across Amasa Washburn (male) and Percy Smith Washburn (female). The EDIT function also permits you to include footnote information, such as source material, for each record. Once the footnotes are entered, sequential numbers are assigned to them

Family Roots
Quinsept, Inc.
P.O. Box 216
Lexington, MA 02173
(617) 862-0404
List Price: $185
Requires: 96K, one to six disk drives, printer.

CIRCLE 619 ON READER SERVICE CARD

Figure 1: The main menu of Family Roots, showing the six major programs and seven utilities.

```
Choose which program to run, by number:

 1) EDIT       (Data Entry)
 2) CHARTS     (Pedigree/Descendants)
 3) SHEETS     (Person and Group Sheets)
 4) SEARCH     (Examine Family Data)

 5) TEXT       (Free Text)
 6) LISTS      (Lists of Names)
 7) KEYDEF     (Define function keys)
 8) WHAT       (Analyze Diskette)

 9) CONFIGUR   (Set up Parameters)
10) CREATE     (Make Empty Diskettes)
11) ADDRESS    (Make Address List)
12) BLANKS     (Empty Charts)

13) RENUMBER   (Reassign ID s)

WHICH (1-13)?
```

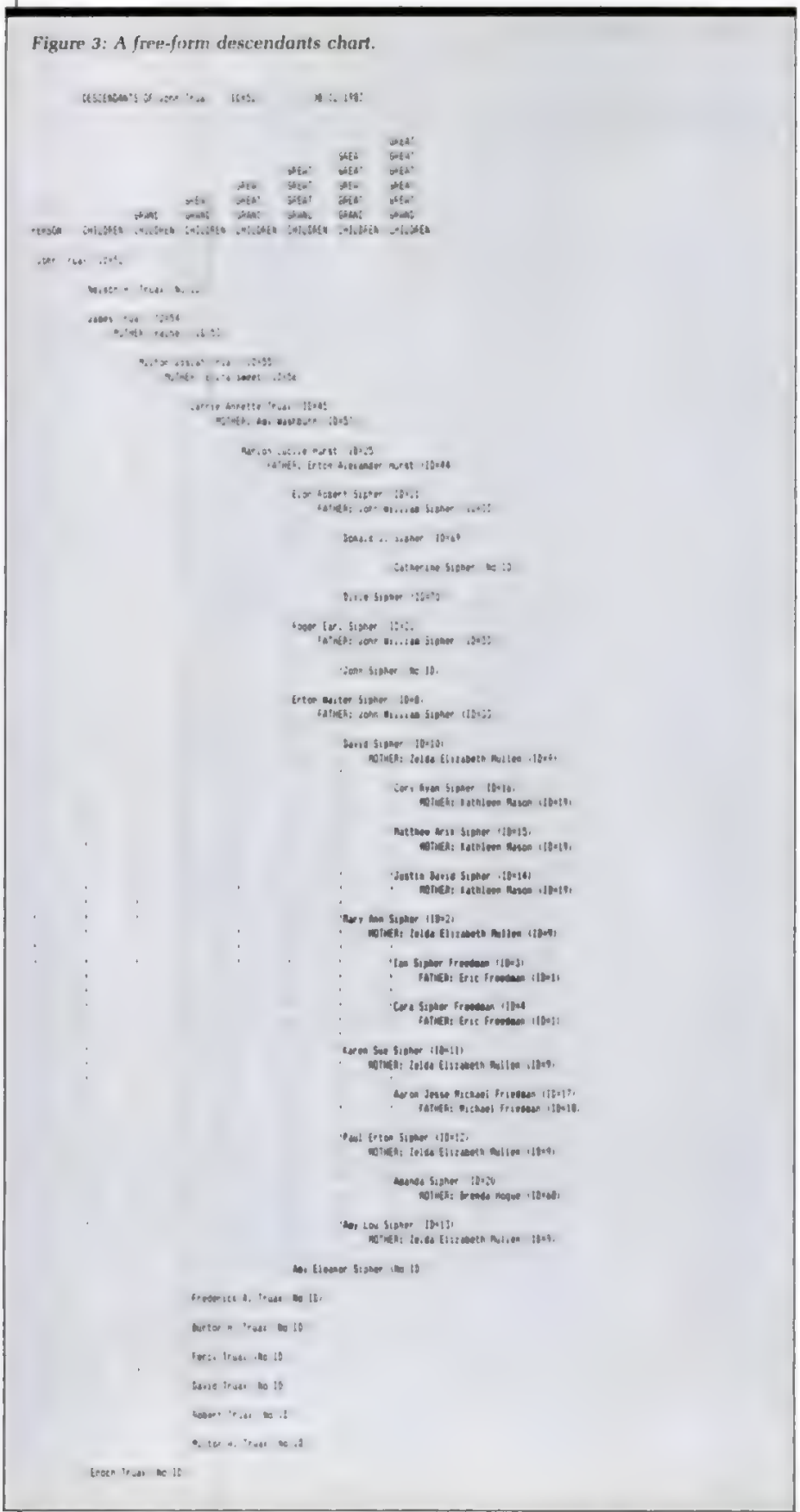
Figure 2: A typical individual record.

```
Eric Freedman (ID=1)

 1) BORN ON: 11061949
 2) BORN AT: Brookline MA
 3) DEATH DATE OR 'LIVING': L
 4) DIED/LIVING AT: 5 Arden Lane; Troy NY; 12180
 5) SEX: M
 6) OCCUPATION: reporter
 7) COLLEGE: Cornell, NYU Law
 8) BURIAL PLACE:
 9) FATHER: Morris Freedman (ID=5)
10) MOTHER: Charlotte Leah Nadler Freedman (ID=6)
11) NUMBER OF MARRIAGES: 1
12) SPOUSE #1: Mary Ann Sipher (ID=2)
13) MARRIED ON: 05241974
14) MARRIED AT: Cayuga Heights NY
15) MARITAL STATUS: M
16) NUMBER OF CHILDREN: 2
17) CHILD 1: Ian Sipher Freedman (ID=3)
18) CHILD 2: Cara Sipher Freedman (ID=4)
19) NUMBER OF NOTES:

ANY CHANGES TO BE MADE HERE (Y/N/S/P)
```

Figure 3: A free-form descendants chart.



automatically by the computer.

As you enter answers prompted by the menu, certain types of information will expand the record fields on the screen. For example, if you give a response for a number of children, the list will automatically be reconstituted to provide space for the name of each child. If you enter more than one marriage for a given subject, the list will provide lines for each spouse's name and for the date and place of each marriage.

One of the principal attractions of the system is its cross-referencing or complementing capability. Let's say you've set up records for yourself (ID=1), your parents (ID=7 and ID=8), your spouse (ID=2), and several children (ID=9, ID=10, and ID=11). Instead of entering each name in the appropriate field for each record, you can fill in the person's record number to

ONE OF the principal attractions of the system is its cross-referencing or complementing capability.

create a cross-reference that saves space on your data disk. If you enter an address for a spouse or a parent, the program will ask whether certain other relatives live there too. If so, that address will automatically appear in the correct field in the other records.

Editing records is relatively easy. You select the ones you want to edit by listing the record numbers, providing a range of numbers, or by name. A minor annoyance, if you generally rely on the cursor control key (number 4 on the numeric pad) to back up, is that you must use the regular backspace with *Family Roots*. To clear a field, use Control E.

Forebear Analysis

The concept of computerized genealogy would have been alien to such people as Comfort Day (1740-1799), a Revolutionary War soldier and veteran of the Battle of Bunker Hill; or Catherine Windecker

BREEDER

PUTS THE FUN

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Sipher, a weaver and spinner who died in 1850; or James Truax, a nineteenth-century farmer and blacksmith. But taking information about these people—discovered in research by Donald Sipher, my wife's cousin—I experimented with the other major *Family Roots* programs.

THE CONCEPT of computerized genealogy would have been alien to such people as Comfort Day (1740-1799).

A CHARTS function gives you a choice of formats for pedigree and descendants charts, including family trees. There is a free-form chart for descendants (see Figure 3) and three varieties of charts for predecessors. The adjustable parameters for any of these charts make it possible to print names only, or to have ID numbers and biographical data appear with each entry. If research takes the user far back into family history, the standard default maximum of seven generations can be expanded.

Although EDIT is used to store data according to standardized fields, it does contain a footnoting capability. If that does not provide enough space, call up the TEXT program, where you can enter, retrieve, and print textual material in free form and store it on separate text diskettes. In contrast to notes, which have to fit into the space allocated to an individual record, TEXT entries are limited only by the space on a diskette. Variable parameters include control over margins, tabs, and lines per printed page.

The SHEETS program is used to display or print data for a family group or a single person, following the format used by the Mormons (see Figure 4). It, too, offers the chance to alter a number of default parameters. If you've used TEXT, the relevant narrative material can be appended to the sheet.

From its name alone you probably can guess what the LISTS program does. Its main job is to provide alphabetical or numerical listings of records, but it also can be used for special purposes, such as merging two alphabetical lists or locating unused ID numbers so that they can be recycled. A bonus is what *Family Roots* calls Soundex. This feature can search

Figure 4: Family group data as organized in the Mormon format.

```
HUSBAND:  Eric Freedman (ID=1)
Born 06 Nov 1949              Place Brookline MA
Marr 24 May 1974              Place Cayuga Heights NY
Died                          Place
Bur.                          Place
HUSBAND'S                                          HUSBAND'S
FATHER:  Morris Freedman (ID=5)                    MOTHER:  Charlotte Leah Nadler (ID=6)
HUSBAND'S
OTHER WIVES:


WIFE:  Mary Ann Sipher (ID=2)
Born 05 Feb 1949              Place Gouvernuer NY
Died                          Place
Bur.                          Place
WIFE'S                                             WIFE'S
FATHER:  Erton Walter Sipher (ID=8)                MOTHER:  Zelda Elizabeth Mullen (ID=9)
WIFE'S
OTHER HUSBANDS:


 M/F          CHILDREN          WHEN BORN     WHERE BORN                  FIRST MARRIAGE    WHEN DIED

 1 M Ian Sipher Freedman (ID=3)    15 Jan 1976   NY NY

 2 F Cara Sipher Freedman (ID=4)   30 Mar 1979   Albany NY

SOURCES OF INFORMATION                                  OTHER MARRIAGES
```

data diskettes for surnames (at birth or as changed by marriage) that sound similar but are spelled differently. When I tried Soundex, it produced some hits and some misses. The documentation cautions, "Don't expect the results of sound-alike searches to produce perfect results. There is still a bit of art in this particular science." Even so, it's fun to play around with Soundex.

To discover how many roofers, accountants, or tailors there were in a family, or how many ancestors were born in South Dakota, SEARCH is the program to use. The user types in the type of information to be looked for and specifies the fields and records to be searched. The resulting list can be displayed on the monitor (see Figure 5), printed, or stored on a diskette.

Seven utilities also are accessible from the main menu. CONFIGURATION is used to set record parameters, hardware configurations, and default values for parameters. KEYDEF can assign temporary values to dedicated function keys, F1 through F10. This is most handy if you want to make frequent entries of specific surnames or geographic locations. Each key has a capacity for strings of up to 15 characters.

BLANKS will print blank charts in the standard format; you specify the number to be printed. CREATE sets up empty data diskettes. RENUMBER is used to reassign ID numbers. WHAT checks and identifies diskettes to tell you whether they contain programs, data, or text. For standard data diskettes, the user is given additional information, including the number of people recorded on it. ADDRESS is used to print a list of people who are identified in the records as alive and for whom addresses have been entered.

A Heritage on Disk

For keeping a simple record of grandparents and parents, *Family Roots* would be a costly and unnecessary investment.

WHEN I tried Soundex, it produced some hits and some misses. Even so, it's fun to play around with Soundex.

But if you're making an effort to trace your family roots, this program can prove valuable—not as a substitute for research, but as a tool for making the most of the information that is unearthed. Using *Family Roots* on a PC also might be a futuristic way to get kids interested in their predecessors. And finally, if you're habitually hard-pressed to think of appropriate gifts for uncles, aunts, and cousins, a printout of the family tree can be a thoughtful way to tend to all your roots. */PC*

Figure 5: The SEARCH program can be used to produce a classifed list; in this case, the names of farmers were extracted from the data.

```
Choose the type of output:

1) farmer

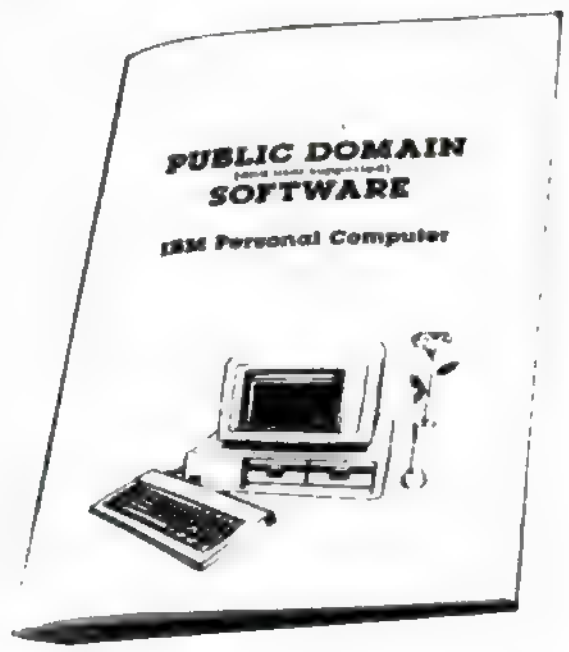
Which (1-1,P)

The following names in memory satisfied the search that you have done:

     8) Sipher, Erton Walter
    10) Sipher, David
    12) Sipher, Paul Erton
    31) Sipher, Ernest Walter
    33) Sipher, John William
    36) Meservey, Alpheus
    41) Hurst, James
    44) Hurst, Erton Alexander
    47) Wilson (Willson), Robert
    52) Truax, John
    54) Truax, James
    55) Truax, Milton Josiah
    58) Sweet, Joshua
    66) Washburn, Perry S.
Press any key to continue
```


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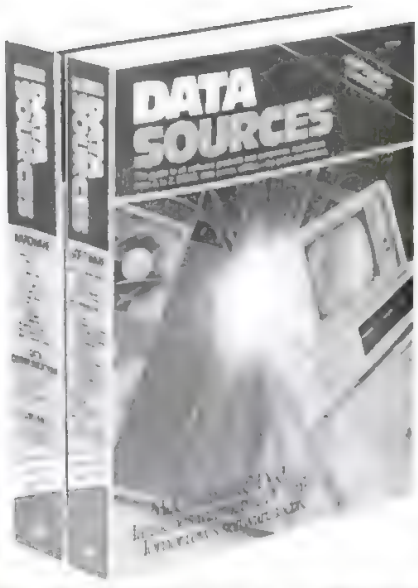
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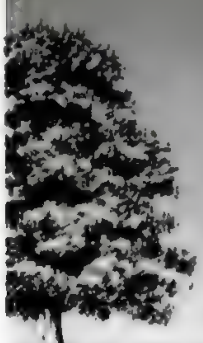
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CIRCLE 278 ON READER SERVICE CARD

Is DOS 2.0 a turkey or isn't it? Why did Peter Norton say such terrible things about the new operating system? Whose side are you on, anyway?

Mr. Norton, I Beg To Differ

After my initial week of exposure to DOS 2.0 on our new XT it was with mixed feelings of agreement, irritation, and amusement that I read Peter Norton's article on the new operating system's "darker" side (PC, "The Dark Side of PC-DOS 2.0," Volume 2 Number 2). That piece had the somewhat spoiled tone of someone complaining that his motorcycle won't fly to the moon.

I find it easy to fault programs too, and I would be remiss if I didn't admit to having my own sessions of fuming at the creators of the software I use, but my opinion of MS-PC-DOS 2.0 varies widely from the opinion of Mr. Norton. Allow me to take specific examples and offer my rebuttals to *PC Magazine* readers, potential 2.0 users, and Mr. Norton himself.

First of all, Mr. Norton says that there are "so many different kinds of problems that it is hard to categorize them in a simple way. Some of them are out and out bugs," and "there are so many problems with 2.0 that I don't think that IBM can sweep them under the rug." Not only do I find many of the errors and "bugs" mentioned in the article nonexistent in my 2.0, but his attitude seems to imply that the program is ill-written and unprofessionally, hastily executed.

NORTON'S article had the somewhat spoiled tone of someone complaining that his motorcycle won't fly to the moon.

I have disassembled all of the DOS, BIOS, and COMMAND.COM programs and spent some time analyzing them and casually scanning the rest of the operating code, and I have a great deal of respect for the software engineering involved. I don't see any evidence of sloppy or unprofessional standards. When one considers that the operating system consists of several thousand lines of source code, the few bugs of the nature I've seen (quite different than those reported), don't seem all that significant. I'm perfectly willing to allow IBM and Microsoft to release a product before every little nook and cranny of code has been verified. It is not operating the Space Shuttle, after all.

First of All . . .

Yes, there were oversights in the human interface, some glaring omissions, some problems with documentation (and yes, there are some bugs). On the other hand, there is a tremendous amount of easy to use, safe, and sophisticated code designed to ease the job of creating applications for the IBM XT. I admit that exploring some of the advanced functions sometimes takes a full night with assembler and debugger, but all complex software is like that. I suggest reading documentation from other manufacturers such as DEC and Digital Research before condemning Microsoft's attempt. I also suggest reading some literature on human fac-

tors in design: Everyone faces the same problems, but a few designers—Microsoft included—do a better job of solving them.

Some statements in the article led me to wonder if Mr. Norton had actually spent much time with DOS 2.0 and read the documentation in depth. He states that the definition of the term *ASCIIZ* was obscurely hidden away in an appendix. Yes, it is tucked away in the appendix for applications and systems programmers—which would be required reading (in full) before attempting to utilize such a thing as an ASCIIZ string—but did Mr. Norton try to use any of the new DOS functions before reading the "Error Return Table" listing? That's the only way he would have missed the definition of ASCIIZ at the bottom of page D-14.

SOME statements led me to wonder if Mr. Norton had actually spent much time with DOS 2.0.

The documentation for using the extended ANSI.SYS keyboard-video driver and the escape-sequence codes is not very good or very complete, but Mr. Norton implies that it is some intractable mystery far beyond comprehension. So I suppose I get the "prize" he mentioned for not only figuring out the keyboard key-reassignment procedure, but also figuring out how to expand the amount of memory space allotted to stored strings by any chosen amount. It's not easy, but it can be done; you just have to do your homework.

I have yet to obtain the "odd" results mentioned when using the command. There is a substantial difference in effect between the /A and /B versions of the Copy command, and one switch stays in effect until another is detected, perhaps accounting for Mr. Norton's anomalies. I frequently need the Copy command to merge ASCII files, and everything came out perfectly.

The redirection of input and output is another victim of unjustified bad press. While the feature is not as good as it could be (on any operating system I've seen), it does perform its stated function. Mr. Norton and PC contributing editor Mark Zachmann determined how they would like the redirection feature to work, then decided that it was "a distressing bug" because the documented behavior of the system didn't meet their expectations.

Yes, I agree that being able to use Ctrl-break on a process that's hung-up waiting for redirected input from an empty file would be nice. However, I don't call this a bug; I call it user error. I didn't expect "resourced" input to disconnect itself and cause the operating system to revert to console input. In any case, the documentation refers to this trait on page 10-5 in **boldface type**—although it's mistaken in saying that Ctrl-break will return you to DOS. I suspect that the line is supposed to read "You **cannot** return to the DOS prompt . . ." Anyway, it would be nice, but what did we all do before we could redirect input and output? This is a case of the ever-rising-expectation syndrome. I say: Learn to use the available software to full advantage before wishing it were different and then claiming it is incorrect.

In his article, Mr. Norton suggests that you might want to use the redirected input-output to answer questions like "Format another?" automatically from a file of responses instead of from the keyboard. Would someone please tell me who would redirect his confirmation inputs away from the keyboard when using the FORMAT command? Is this the appropriate use of the feature? Using redirected input to supply an unknown number of parameters is not how this is intended to be used. It would be better to patch the FORMAT utility.

On the other hand, if it is necessary to execute a complex set of operations repetitively from the keyboard under known and fixed conditions (such as inserting and deleting specific lines in EDLIN or generating disassembly and memory dump listings in DEBUG), then causing the commands to be read in from a text-file generated for that purpose works fine—as long as there is a termination of the command sequence back to a batch file that can reset the input function to the console. Mr. Norton may as well rail against the fact that if he programs a nonterminating loop in machine code, the computer won't let him recover by pressing Ctrl-break.

On the Contrary

"The Dark Side of PC-DOS" mentions "that an old bug from previous versions of PC-DOS still hasn't been fixed. Under the wrong circumstances, Debug can get hung up tracing a program, due to poor handling of the timer interrupt." I don't find the ROM timer-interrupt handler poor at all; the code increments the memory counters to keep track of the time of day, calls a user-defined interrupt, then clears the original request and returns. This is straightforward, not "poor." The complaint seems to be that a simultaneous timer interrupt and single-step interrupt (using the Debug T command) causes the timer request to remain pending while the single-step code executes. If the single-stepper then enters a state where it is waiting for keyboard input (after a single trace), the computer hangs up as it waits for the keyboard interrupt, which is blocked by the pending timer interrupt.

I wouldn't have believed this except for another article appearing in the August PC in which another reader voices the same complaint. I wish someone would tell me why I don't have this problem; maybe it's simply a question of luck. The probability of a timer interrupt occurring just as the T command routine executes the target instruction it intends to trace is about 1 in a million, assuming a 1 microsecond clock-pulse width and a random interval between T commands. If these odds still bother you, turn off the timer with an O 21 BD command (in DEBUG).

I DON'T call this a bug; I call it user error.

After debugging and tracing hundreds of lines of code, both mine and other people's, I have yet to find a case of a Debug-crash where the fault wasn't my own. More likely causes of crashes could be:

- Tracing operating system code (dangerous, and not often successful)
- Setting breakpoints in the DEBUG program or the operating system (most likely fatal)



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I suppose that "under the wrong circumstances" people will make mistakes while using DEBUG. The same goes for airplanes and missiles.

The FIND and SORT utilities are maligned as "unpredictable," and Mr. Norton says that "SORT has been known to report that it is out of disk space . . ." This sounds like second-hand information to me. Check your sources.

I haven't yet caught the FIND command giving me things that weren't there, as claimed in the article, and the simplistic output formatting of the FIND command is about what one would expect. The usefulness of these utilities seems limited anyway, so I don't use them for database management and report generation. When I use them, however, I seem to be able to Find and Sort all my dir's (lower case in my COMMAND.COM), and any "You have a new message" messages on our inter-user memo system: No spurious data has ever surfaced. SORT also seemed to perform perfectly; it alphabetized an entire hard-disk PATH/F output (some 235 file names and 20 path names) with no errors (such as "out of disk space").

Compatibility vs. Efficiency

Much woe is expressed over the "sabotage" built-in to two of the DOS functions, which now operate differently than before. Mr. Norton was "appalled by what was done with 2.0." What was done to 2.0 was that an inefficient disk format was modified to be consistent with standard disk access algorithms. The result is half as much movement of the read/write head between tracks—not exactly sabotage, but an improvement, the fact of which Mr. Norton acknowledges. But Mr. Norton seems to feel that Microsoft somehow has a responsibility to ensure that all revisions and updates to its software maintain compatibility at the expense of good and efficient design. If Microsoft were bound by such constraints, it could not upgrade and improve its product.

I don't recall reading anywhere in the DOS licensing agreement that all software written under 1.1 was to remain 100 percent compatible with future upgrades. I was not led to believe that I was in a position of "trusting" Microsoft to play by any rules. It is a programmer's responsibility to build in to his methodology a way in which changes and improvements can not only be integrated, but encouraged. Why would anyone expect Microsoft to stay with the old inefficient cluster-numbering scheme? Yes, some software may have to be reassembled and recompiled, which is not too much trouble if the source code is written as it should be. For anyone who cares about access time and efficiency, the change is a boon. (The DOS calls recommended for absolute sector accesses are recommended because it is impossible to access sectors that are renumbered by various IBM software copy-protecting schemes through those calls. I can see no other reason.)

I HAVE yet to find a case of a Debug-crash where the fault wasn't my own.

Of all things to lodge a complaint against, Mr. Norton decries that his Echo command is overridden by the batch file processor "if the last command in the batch file doesn't end with a carriage return." I would like to know why Mr. Norton chooses not to terminate the last command in his batch files with a carriage return. And why does he think it's Microsoft's responsibility to adjust the Echo command if he terminates a line with the END OF FILE marker. This is obviously intended to inform the operating system to turn the prompt on so that the user may know that the batch is finished. How does Mr. Norton propose that the system notify the operator that a batch file is done executing if it doesn't turn the prompt on? Would he rather be required to put an ECHO ON statement at the end of each batch file? Be my guest. What are "the bugs in ECHO" that "defeat much of its purpose"?

Mr. Norton's notion of command syntax is unique. "You should be able to use commas, spaces, or some other characters freely to separate the values for the parameters" when entering command lines. He might as well say that Pascal should accept commas, slashes, or whatever else anyone feels like typing as delimiters between identifiers and reserved words when scanning a line. Or perhaps BASIC should accept a statement like "FOR 1 TO 300 (STEP 5) . . . PRINT: HELLO, I AM FINE, ARE YOU? NEXT." Is it that much trouble to press the space bar between parameters? This may bring up a point having to do with command languages as a whole, and fault-tolerance of typing errors, but I don't think that this implementation is at odds with currently accepted standards. When the scanner wants a blank, give it a blank; I don't see the problem.

Legitimate Gripes

Now, how about the important omissions and errors in 2.0 from my perspective?

- You can't define local or global symbols to the operating system, even though the SET command is provided. Wouldn't it be nice if you could say, "SET DATA=IMWRK*.*" and then get a directory of those files by typing DIR DATA for the rest of the day?
- There are no built-in provisions for easily assigning and storing the key assignments you can make through the extended ANSI driver, and there is a serious bug in the code that loads the key assignments, which can cause the computer to hang.
- How about being able to ASSIGN PATH names, so that all disk accesses that an old 1.1 program reads as "access to DRIVE A:" are instead routed to C:\DIR1\DIR2\ETC ETC ETC.?
- How about directing output to more than one channel at a time, like AUX and CON?
- How about a better text editor?
- How about a command to input responses such as the VMS ENQUIRE statement from the keyboard during batch file execution?
- How about a set of system-operator privileged commands to help facilitate a shared-resource management scheme?
- How about more flexibility in the "wonderful" hierarchical directory structure? Longer filenames?

To summarize, there is plenty that I would like to see in a personal computer operating system and plenty I would like to see fly out the window. In all fairness to

everyone, I would say to Mr. Norton that much is to be desired in the present implementation of all software, be it MS-DOS 2.0, CP/M, UCSD p-System, or disk-utilities packages.

WHY WOULD anyone expect Microsoft to stay with the old inefficient cluster-numbering scheme?

Everyone is in the dark ages of "user-friendliness," mostly because it takes a tremendous effort to get a computer to do anything. The state-of-the-art in home computers is such that we'll all be laughing in 20 years over DOS 2.0, CP/M, and the rest.

It takes shell upon shell upon shell to hide the intricacies of gates, bits, and bytes from someone who deals exclusively in market shares or bread recipes. An operating system is only one lower layer of a series of those shells.

DOS 2.0 is still what all operating systems have been to date: an application development environment, not intended for the general out-of-the-box-do-everything situation. As such, as an environment for developing software that nonprogrammers want, software that masks the inadequacies of computers (which programmers are paid to be able to deal with, exploit, and circumvent) from the users, it is the best bet going. Which is not to say that the game's not going to change. */PC*

Gregg Weissman is director of software development and chief programmer for the New York firm of Village Information Company, Inc. He designs software for the IBM PC and XT. Before joining Village Information, Weissman wrote graphics software for Laserium.

For Peter Norton's discussion of the problems of technical criticism, see "The Norton Chronicles" in this issue.



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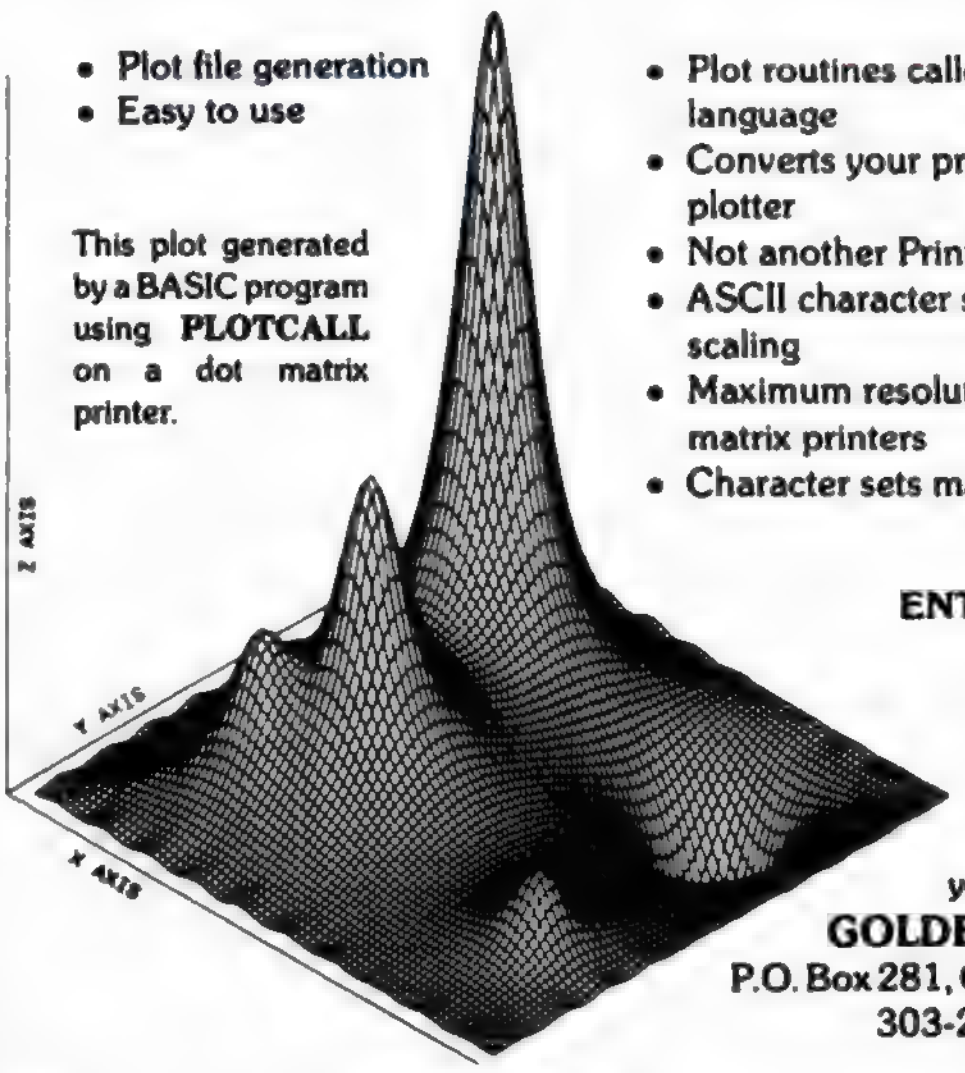
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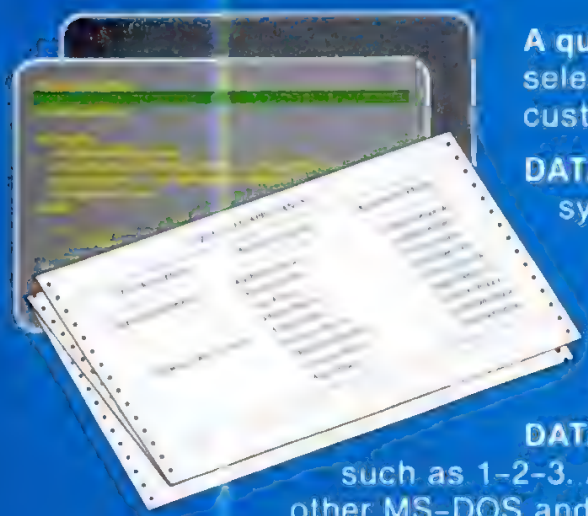


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By following these step-by-step instructions, you can set up keys that will output longer strings of text when they are pressed.

Assigning Strings To Keys With PC-DOS 2.0

The manual for PC-DOS 2.0 mentions that you can assign any character string to any of the keys on the IBM PC's keyboard. You could create command lines and text that can be called up with single keystrokes from PC-DOS, just as can be done from BASIC. However, the manual is sketchy and obscure when it comes to actually explaining how to do this; it doesn't include step-by-step instructions.

After some experimentation I found a method that worked, which I will explain here. I also discovered that there is a limit to the total number of characters that can be assigned to the keyboard in this way—the computer will crash if you try to exceed this quota. The manuals don't mention these facts at all. If you're adventurous and somewhat familiar with DEBUG, you might follow my additional instructions to increase the maximum number of characters allowed while implementing a key-assignment scheme.

Directing the Device Driver

The portion of an operating system that controls input from the keyboard and output to the screen is called the *device driver* because it controls those devices. PC-DOS has been designed to allow you to easily replace those device drivers with others. In the following case, the normal keyboard/screen input/output program (the Console device driver) will be replaced with the ANSI.SYS device driver. This extended program contains the logic for detecting and acting upon the special sequences of characters known as *escape sequences*, so-called because they all begin with ASCII code value 27 decimal, which stands for Escape, a term dating back to teletype days. The escape sequences translate into the key assignments you wish to make.

The first step is to get the ANSI.SYS program loaded into the computer by creating a configuration file called "CONFIG.SYS"; this will tell the operating system what to do with itself. If the statement "DEVICE=ANSI.SYS" appears in the CONFIG.SYS file, PC-DOS will load ANSI.SYS in place of the standard keyboard/screen console device driver. For more information on the DEVICE command and ANSI.SYS, refer to pages 9-7, 9-8, and Note 1 on page 13-2 in the PC-DOS 2.0 manual.

Changing the Device Driver

If you'd like to see this information in action, type in the following two lines to copy a CONFIG.SYS file to your disk:

```
COPY CON: C:\CONFIG.SYS
DEVICE=ANSI.SYS
```

(In the first line, "C:" is the label for the fixed hard disk. If you want to use a different disk drive, substitute the appropriate label.) After entering the second line, press F6 and then the Return key.

Now the extended console driver will be loaded from disk when the operating system starts. If this is the first time you have included the CONFIG.SYS file and the "DEVICE=ANSI.SYS" command, first reset the computer so that PC-DOS can load up the ANSI program—otherwise the examples in the article won't work.

The next thing that happens after the ANSI.SYS is loaded, is that PC-DOS 2.0 "calls" an initialization routine within the driver; PC-DOS asks the driver to set itself up (as it were) and return an address that is the last memory location the ANSI.SYS driver will occupy. PC-DOS needs to know how big the driver is, so it can utilize the memory above it for other functions. In its present, unmodified state, the ANSI driver returns an address that allows space for 200 of your defined character strings in addition to the program itself.

Once this initialization is complete, PC-DOS goes about its business, which normally has nothing to do with getting

special things to happen when keys are pressed. The next step is up to you.

Assigning Strings to Keys

The way that you assign a string to a key on the keyboard is simpler than it may appear in the PC-DOS 2.0 manual. All you need to do is to send a sequence of characters to CON, which is the driver for the keyboard/screen console driver. Ultimately, this can be done either by sending the appropriate data to the CON device with the COPY command or by TYPEing the appropriate file. Either way, as long as the file contains the proper sequence of characters, the driver will interpret the file as key assignments (the file can also provide screen controls, but that should be the subject of another article). Instead of having any text appear on the screen, as would normally happen when you TYPE a file to the console, the keys you specify in the file will be set up to return the string you assigned to them.

The form of the escape sequence that will cause the ANSI.SYS driver to assign text to a key is also simple. The first character must be the Escape character, which has an ASCII value of 27 decimal. (This would be CHR$(27) in BASIC; in hexadecimal, the value is 1B.) When the ANSI driver sees you trying to print the character with a value of 27 decimal, it prepares itself to respond to subsequent characters not as characters to be printed to the screen, but as codes that you wish to be interpreted for you. The next character must be a left bracket, ([)—its ASCII value is 91 decimal or 5B hex. Once the driver has detected the Escape character, nothing will happen until it next detects the left bracket.

Up to this point, the driver has seen the Escape character and the left bracket ([), and is prepared to interpret the remainder of the command sequence either as numeric values (represented by ASCII text digits) or as literal characters. In the first case, the driver interprets ASCII digits "0" thru "9," and calculates a binary value for the represented digits. If the driver is sent the ASCII value for 1, followed by the ASCII value for 9, the program calculates 19 decimal. If ASCII codes for 1, 2, and then 0 are sent, the resulting ASCII value is 120 decimal, and so on. The program continues to receive and calculate until it detects a semicolon character (ASCII value 3B hex), which serves to tell where one number leaves off and another one begins.

Up to this point, the command string

ASCII CODE value 27 decimal stands for Escape, a term dating back to teletype days.

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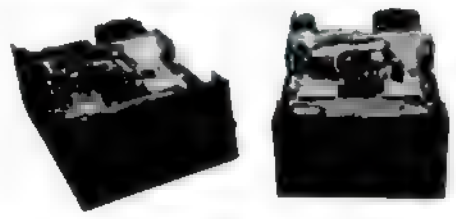
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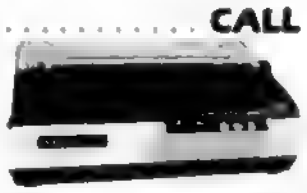
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looks like this: <Escape> [<ASCII digit><optional ASCII digit><optional ASCII digit>;

In the "1,2,0" example above, the command would mean that you are telling the program to reassign the key that sends out the ASCII code 120 decimal when it is pressed. (If this matter still seems confusing, don't worry—it is confusing.) What is going on is that you are using ASCII codes for digits to represent the decimal value of another ASCII code that the keyboard sends out. If you were to look at the hexadecimal representation of the sequence so far, just as the ANSI driver receives them, it would look like this:

```
   1B      5B 31 32 30 3B
<Escape>   [  1  2  0  ;
```

Now, if you send a single or double quote mark to the driver, it will store the next sequence of characters into memory as is, to be sent out later as a string of text whenever it detects key 120 decimal (which is lower-case "x").

Making a Key Assignment

Say you wish to have the computer spell out "EXAMINE" whenever you press lower-case "x." Your next command-sequence would then be: <ASCII quote-mark> EXAMINE <ASCII quote-mark>, followed by another semi-colon, then a lower-case p (p is the "Yes, I really meant that—now do it!" command to the driver program).

The following procedure demonstrates how you could assign a string to a key by using the DEBUG program. Assume the same conditions as before; that is, you wish to have the computer type the word "EXAMINE" when you press the lower-case x key. You must use the DEBUG program at this point because you can't enter the Escape character from the keyboard. Under PC-DOS, the Escape key is interpreted as "cancel the input line." A little later I will show a BASIC program that will automate all this, but for now, from PC-DOS, start the DEBUG program by typing DEBUG.

WHEN YOU see the dash prompt (-), DEBUG is ready to use.

When you see the dash prompt (-), DEBUG is ready to use. Type this line as it appears, quotes and all. (The 22 that you type on either side of "EXAMINE" is the ASCII hex value for a double quote mark.)

```
E 100 1B ''[120;'' 22
''EXAMINE'' 22 ''p''
```

Then press the Return key. What you did was to give the ENTER command (E), then the required sequence was entered directly into memory. Now type D 100 and press return. Look at the hexadecimal values on the first line at the left of the screen; they should look familiar:

```
1B 5B 31 32 30 3B
```

Now look to the right of the screen; you should see:

```
.[120;''EXAMINE'';
```

Perhaps the result is a little clearer in this form.

Pressing the lower-case x key will return the ASCII value 120; that value is looked up by the console driver, and the associated string "EXAMINE" is printed out. Before this will work, however, you must write the little file you created onto the disk. To do so, type R CX and press Return. When you see the prompt, key in 10 and press Return; then type N KEYX.ANS and press Return to give the file the name KEYX.ANS. If you want to save the file on a different disk, type a drive designation before the file name; for example, you could key in N B:-KEYX.ANS to assign the file to the B drive.

After naming the file, press the W key and then Return. The computer will respond with the message "Writing 10 bytes." When that process is over, press the Q key and then Return to exit from DEBUG. Check the disk directory to verify that the new file called KEYX.ANS is actually saved on the disk. Then type:

```
COPY KEYX.ANS CON:
```

and press Return. (If you had put KEYX.ANS on another drive, make sure to include the drive's name here.) When you do this, nothing should happen except

Figure 1: A BASIC program that prompts a user to assign strings to the ten function keys.

```
10 DEFINT I-Z:DEFSTR A-H
20 DIM ANSI.KEY(10)
30 FOR I=1 TO 10
40 ?''KEY NUMBER '';I;'' STRING'';:INPUT ANSI.KEY(I)
50 NEXT
60 REM This is an admittedly oversimplified input routine.
70 OPEN ''0'',#1,''KEYS.ANS''
80 FOR I=1 TO 10
90 ASKEY.CODE=MID$(STR$(58+I),2)
100 REM Line 90 strips off the leading blank from the string.
110 PRINT #1,CHR$(27)''[0;''ASKEY.CODE'';''CHR$(34);ANSI.KEY(I);CHR$(34)''p'';
120 REM Note the trailing semicolon at the end of line 110.
130 NEXT
140 CLOSE
150 END
```

that the message "1 File(s) copied" and the PC-DOS prompt will appear.

Now type a lower-case x, and see what happens. If "EXAMINE" didn't appear on the screen, either the ANSI.SYS console driver hadn't been installed (see the beginning of this article) or you keyed in something incorrectly. Try again after making sure the device driver is installed.

Automated Assignment with BASIC

What a laborious process that is! Who wants to go through all that each time you assign a word to one key? Not me—or you, probably. But here's a more effective solution: the entire keyboard could be defined by running a BASIC program that writes the control codes to a sequential disk file, which you can then TYPE or COPY to the console driver. But before I present this BASIC program, another word on the ASCII values for keys is in order.

It would be nice if we could leave the standard key definitions as they are, and assign special character strings only to the function keys or Alt keys. The way to do this is to define the first number sent after the Escape and left bracket characters as ASCII value zero; this is followed by the semicolon, the actual "extended ASCII code" for the key desired, and finally the string assignment itself. A list of the function-key values can be found on page 3-14 of the Technical Reference Guide. You can use all the function keys in the standard, Shift, Ctrl, or Alt modes; actually 40 different codes can be assigned to the function keys. In addition, all the alphanumeric keys can be used in the Alt mode, including such keys as Home and End. However, as I mentioned before, this vast versatility is limited by the 200-character limit imposed by the unmodified ANSI driver.

Figure 1 is a simple BASIC program that could be used to let you go through the ten function keys, one at a time, and assign a different string to each one. When the BASIC program finishes and saves the KEYS.ANS file to disk, you can enter DOS, then type the file in order to effect the key assignments.

If you avoided the 200-character limit by being conservative with the length of strings you assigned to the function keys, you should now be able to return to DOS from BASIC by typing SYSTEM, then COPY the KEYS.ANS file to CON by entering:

```
COPY KEYS.ANS CON:
```

If the computer hangs up, well, thank Microsoft for the overflow glitch—don't blame me. Just reboot to start from scratch with PC-DOS and trim down your string dreams for now.

Figure 2 shows the key assignment program in use. If you succeed in assigning strings to your function keys, but get tired of that set of tricks, you can eliminate the key assignments by rebooting the system. You can also run the BASIC program in Figure 1 again to input blank "null strings" that eliminate the key assignments. */PC*

Figure 2: A demonstration of using the program in Figure 1.

I wanted to be able to press any of the ten function keys and have the French word for its number appear on the screen. I ran the BASIC program in Figure 1 and keyed in the lower-case words in response to the prompt on each line.

```
KEY NUMBER 1 STRING? un
KEY NUMBER 2 STRING? deux
KEY NUMBER 3 STRING? trois
KEY NUMBER 4 STRING? quatre
KEY NUMBER 5 STRING? cinq
KEY NUMBER 6 STRING? six
KEY NUMBER 7 STRING? sept
KEY NUMBER 8 STRING? huit
KEY NUMBER 9 STRING? neuf
KEY NUMBER 10 STRING? dix
```

After entering the string for F10, I was returned to PC-DOS. I then saved the file of key assignments by entering the following after the prompt:

```
C>COPY KEYS.ANS CON:
```

The computer responded with "1 File(s) copied" and another prompt. Following this prompt, I pressed each of the function keys and the French names of the numbers appeared.

```
C>un deux trois quatre cinq six
sept huit neuf dix
```

When I pressed Return again, the screen read "Bad command or file name."

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Modifying the ANSI.SYS Console Driver

By making more ambitious use of DEBUG in PC-DOS 2.0, you can increase the PC's capacity for strings assigned to keys.

If you now understand how to assign strings to keys, and if you are familiar with the DEBUG program, you may want to take this next step—modifying the ANSI.SYS file to allow longer strings and more keys to be assigned. But beware: this can get tricky. If you're not comfortable with messing around in machine-language files, go very slowly. And, although this procedure seems to work okay on my version of PC-DOS 2.0, I can give you no guarantees.

The first thing to do if you undertake this project is to make a backup copy of the file called ANSI.SYS. To be on the safe side, you may want to modify this file on a separate diskette before modifying the hard disk's system files. It would be a funny feeling to have 2.5 megabytes of valuable data refuse to boot. Have the CONFIG.SYS file set up to load the ANSI.SYS file, as explained in the earlier procedure, by keying in these two lines:

```
COPY CON: C:\CONFIG.SYS
DEVICE=ANSI.SYS
```

After entering these two lines, press F6 and then Return.

You should find it helpful to obtain a disassembly of the ANSI.SYS file from the debugger. To obtain the listing, press Crtl-PrtSc, then call up DEBUG along with the name of the file by entering DEBUG ANSI.SYS. Then type U 1A2 750, press Return, and take a break until the disassembly prints out. It would be a good time to read the rest of the procedure. I assume you have the DOS 2.0 DEBUG program that allows you to assemble simple commands directly to memory—if you didn't have 2.0, I doubt you would be doing any of this.

Four changes have to be made to the program: 1) the initialization procedure has to return a higher ending address to DOS upon completion of initialization; 2) the maximum value test for the total number of characters assigned to keys must be increased; 3) the initialization procedure must be actually moved to make the necessary room and pointed to within the device driver itself; and 4) a new end-of-buffer-value loaded into the CX register must be altered to conform with our changes.

The first step is to move the initialization code up by 300 hex bytes, using the "M" command. It might be a good idea to keep the Ctrl-PrtSc printing turned on to maintain a log of what you do here in case there are problems. You can refer to the printout later and check your work.

Look at the listing from 0709 to 074D. This is the initialization code that we will move. Type M 709 750 A09 and press Return.

You have just moved the code up 768 bytes, enough for many more keys to be assigned. But now we must compensate. Look on the screen to find the disassembly at 0A42. It reads:

```
MOV WORD PTR [BX+0E],0609''
```

This is the code that tells DOS that it can have back everything from 0609 hex on, relative to offset 0 in the segment where the device driver is loaded. The code you are seeing now has an offset of 100 hex added to it by the debugger. In DOS now, the code you moved from 0709 is actually located at offset 0609; this is precisely where the driver released its claim on memory. We have to add 300 hex to the value passed to DOS as well. You may use either the "A" command or the "E" command to change the value "0909" (not 0A09—remember the 100 byte offset from the debugger?)

To use the "A" command to assemble a new instruction, enter these two lines:

```
A 0A42
MOV WORD PTR [BX+0E],0909
```

To use the "E" command, enter this line:

```
E 0A46 09
```

Either method has the same result. Next, look at the code on the screen at location 0A4A. It reads "JMP 04DE". Use the "A" command and change that by entering these two lines:

```
A 0A4A
JMP 01DE
```

This compensates for the jump forward of 300 hex bytes, as JMP instructions are calculated as an offset from the current instruction (more or less). That's why you effectively subtracted 300 from the JMP offset using the "A" command. (A good exercise would be to try using the "E" command to directly input the re-calculated offset that must be added to the location counter so that you land in the right spot.)

Does everything seem all right so far? Double check! One slipped bit is all it takes.

Next, just for cosmetics, fill the locations once used by the initialization routine (and any other garbage that was lying around in the computer in between the old and new initialization routines) with zeroes, so that the key-string buffer loads up empty. Use the "F" command by entering:

```
F 0709 0A00 00
```

Now use the "D" command to look at the "device driver header" up at offset 100. Start by keying in D100. (Look on the screen, as you didn't print out this portion.) Specifically, look at offset 0112. Two consecutive memory locations should read: "09 06". This was the offset from 0 of the initialization routine. Change the byte at 0113 to 09 by entering:

```
E 113 09
```

The offset is now that of the relocated initialization code. Remember that the offset will be 100 hex less than the offset you see in DEBUG.

You can increase the limit on the number of stored characters, now that there's room for them. Look at the code at 0630. It reads: "CMP BX,00C8".

By using the "A" command again, you can enter a nice round figure like, say 02C0: this would raise the maximum number of allowed characters to 704. (I like to leave a lot of leeway here until the crash problem is solved, but theoretically you should be able to use all the memory from 541 to 0909—a total of 3C8 hex bytes, or 968 decimal.) To do this, enter these two lines:

```
A 630
CMP BX,02C0
```

We're almost finished now. Look at the code at address 05FF. It reads "MOV CX,0609". That number seems familiar, as it is the offset to the old initialization routine, and it appears at the end of the key-string buffer. You have to preserve the same offset relations with the other changes made, so change the code at 05FF to read "MOV CX,0909" by entering these two lines:

```
A 05FF
MOV CX,0909
```

The changes to code are now complete! One final step. We have to write the debugged file to disk, but the size of the file must be increased to take into account the expanded buffer and relocated initialization code. Type R CX. The computer should respond with "CX 0680". You should now enter 980. Your ANSI.SYS file will now be 768 bytes larger. Enter W and the computer will respond with "writing 0980 bytes."

When this is finished, you will have vastly more potential to assign strings to the keyboard. The ANSI.SYS file will load when you reset the computer, and you can then test your work. If anything weird happens that didn't happen before you made these changes, double and triple check your modifications. Start from the beginning if necessary. Though the effort may seem great now, afterwards you can let the computer do some of your typing once you've assigned strings to keys to your heart's content. Theoretically, there should be no limit to the storage space you can add to the key buffer, using this technique.

—G.W.

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The engineering software developed by the Systems Division of Physical Sciences Inc. indicates the range of possible applications for the PC. Supported for the TRS-80 Models I and III, the software is touted as the only powerplant and chemical process flowsheet analyzer that operates on microcomputers. These programs are written in BASIC and demonstrate the power of the language as well as some of its limitations.

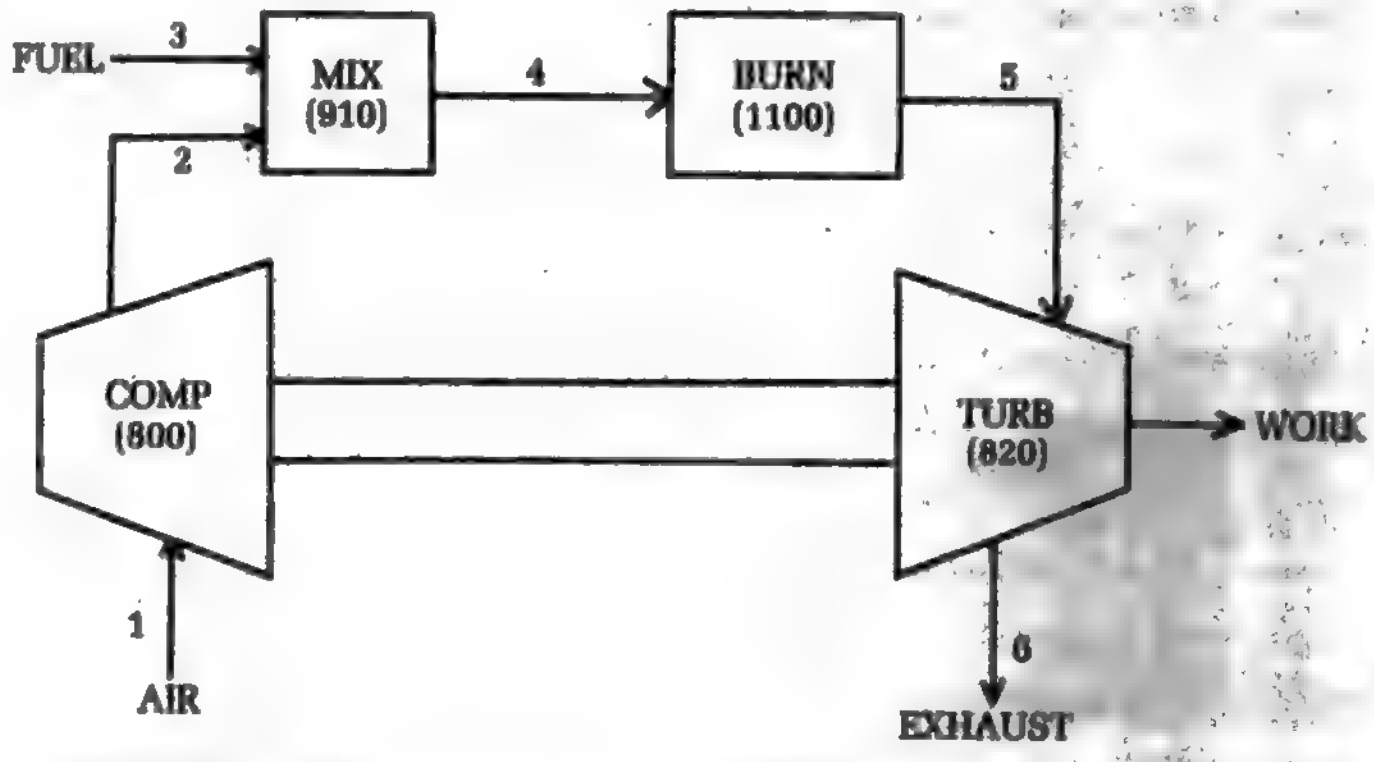
Engineering Tools

PSI/Systems engineering software can be viewed as a set of tools for the working engineer to use in the analysis of thermodynamic systems such as power plants. These tools are in the form of subroutines, which PSI/Systems calls "modules," and are functionally grouped into packages, or "PAKs." The complete library of engineering software consists of eight PAKs: S3EPAK, for systems analysis; THERMOPAK, for analysis of the thermodynamic properties of gasses and liquids; MATHPAK, for developing curve-fitting routines, simultaneous linear equations, and other applications; FLUIDPAK, for applications involving compressors, turbines, etc.; HXPAK, for heat exchangers, boilers, and condensers; REACPAK, for reformers, gasifiers, etc.; FCPAK, for phosphoric acid, molten carbonate, and alkaline fuel cells; and PDROP, for pressure drop of gasses, liquids, or in circular tubing. This review is limited to the S3EPAK, THERMOPAK, MATHPAK, FLUIDPAK, and PDROP.

The PAKS may be purchased separately or in various combinations. The S3EPAK is the core of the software line. (S3E stands for State Systems Engineering.) Most applications will use the S3EPAK, which includes a tutorial, in combination with one or more of the other

Figure 1: A sample program for a turbine system analysis. The schematic diagram shows the major elements in the flow of gasses through a turbine system.

```
4000    REM QUICK REFERENCE EXAMPLE
4010    REM DEFINE AIR FLOW TO COMPRESSOR
4020 N=1:A(6,N)=50:A(7,N)=3.7733*A(6,N):T(N)=70:P(N)=1
4030 GOSUB 400   :GOSUB 3410 :GOSUB 10
4040    REM DEFINE AIR THROUGH COMPRESSOR
4050 IP=1:OP=2:RC=3.5:EC=.82:GOSUB 800
4060    REM DEFINE LIQUID NAPHTHA FLOW TO MIXER
4070 N=3:A(6,N)=1:P(N)=3.5:T(N)=70:XN=7.25:EN=1.8
4080 GOSUB 400   :GOSUB 3410 :LQ=1:GOSUB 10
4090    REM MIX AIR AND FUEL
4100 I9=2:J9=3:K9=4:GOSUB 910
4110    REM CHANGE TO NAPHTHA VAPOR
4120 CLS:NN=0:GOSUB 10
4130    REM FIND NEW ADIABATIC INLET TEMPERATURE
4140 N=4:GOSUB 10
4150    REM BURN FUEL
4160 IP=4:OP=5:GOSUB 1100 :GOSUB 1070
4170    REM SEND BURNER EXHAUST THROUGH TURBINE
4180 IP=5:OP=6:RT=3.5:ET=.9:GOSUB 820
4190 PRINT "COMPRESSOR WORK=";CW/3413;" KW"
4200 PRINT "TURBINE WORK=";WT/3413;" KW"
4210 PRINT "NET WORK=";(WT-CW)/3413;" KW
4220 STOP:GOSUB 1000 :END
```



PAKs. Because of this central role, PSI/Systems refers to the framework created by the S3EPAK as the S3E environment. Calling it the S3E/BASIC environment might be more descriptive, since some programming ability is necessary to put the modules together into an applications program.

The appropriate modules are assembled into an integrated program, which is tied together by a main program module written by the user. The result is a mathematical model of the physical system being designed or evaluated. A familiarity with BASIC and about 2 years of engineering coursework are necessary for the user to effectively employ these tools.

Documentation

The documentation provided by PSI/Systems for their engineering programs is more complete than those typically supplied in applications programs for the PC. The manual is readable, if not inspiring, and includes examples to illustrate key features.

The manual is organized into sections corresponding to the various PAKs. Each section contains a table of contents arranged by module. A useful addition would be an index that directs the user to the appropriate PAK for the desired module. Without an index, the user must spend time searching the contents of one PAK after another to locate a particular module. Other problems stem from the fact that the packages were originally developed on a TRS-80 Model I computer; all of the program listings in the documentation that I received are in the TRS-80 BASIC form. Since there are minor differences between the TRS-80 and the IBM PC versions of BASIC, the user must make new program listings for the PC. If PSI is serious about the PC market, it should print a revised version of the manual specifically for the IBM Personal Computer.

The manual's instructional format varies slightly from module to module, but not enough to cause any difficulties. The instructions for each module are generally divided into the following four sections:

- *Background*—This section describes the functions of the module, including important equations used. Since the manual makes no attempt to be a tutorial on thermodynamics, the treatment of these equations is rather brief; references are provided for those who want or need additional information.

- *Input/output*—This section explains which variables the module requires for input and what it provides for output.

- *Program listing and operating sequence description*—In addition to a BASIC listing of the module, a line by line explanation of the module's operation is given in this section. It serves as a supplement to the comments in the program segments and is an invaluable aid when the user must modify one of the modules.

- *Variable inventory*—This list and description of all the variables used by the module is one of the handier features of the manual. Since BASIC has only global variables, meaning that all parts of the final program have access to all of the variables used anywhere in the program, this inventory is very important. If the same variable is used by unrelated modules, its value can be changed in unpredictable ways and an unreliable program would probably result. The user can consult this inventory to avoid misusing variables included in the modules that he is putting together into a complete program.

Constructing a Model

A model, the mathematical rendering of the physical systems to be designed or evaluated, is built by writing a main program module and an INIT (for initialization) module in BASIC. The BASIC Merge command is then used to add the required modules. Line numbers 4000 to 4999 are reserved for the main program; 1 through 9 are reserved for the INIT module. The number of modules available varies with each PAK.

Worthy of note is the INDEX module, which is a great help when merging modules and debugging the final program. It gives the module locations by name and program step numbers, as well as a list of the variables used by each module. The information about the modules is alphabetically arranged in a file called INDEX.DAT, which the user can alter to

reflect changes or additions. Unfortunately, the INDEX module uses sequential access and prints each entry to the screen during its search. This process is slow and can be irritating. The first time that I used it, I thought that the program was malfunctioning.

PSI/Systems should rewrite the INDEX module using random access and an efficient search methodology so that it will live up to its potential usefulness.

A sample program for a simple turbine system is provided to demonstrate modeling procedures (see Figure 1). The user types in the main program example in Listing 1 and is instructed to merge the appropriate modules to produce a complete program. Here, the instructions are simply inadequate and contain both inaccuracies and omissions. The instructions called for COMP2, TURB2, and BURN3 modules, but the diskette supplied by PSI/Systems had COMP, TURB, and BURN2 modules. The instructions also called for the LPRNT module, which didn't exist on my distribution disk. What it did have was a module called LPRNT2 for the IBM dot matrix printer and LPRNT3 for use with a daisywheel printer. Omitted from the list of modules to merge were the EQUATE2 and MIX2 modules, which are necessary for the program to run. One of the modules also required a little editing before everything would run properly.

After some experimentation and a phone call to PSI, I had the example program up and running. PSI's response to my call was friendly and helpful, but the instructions given for this sample systems analysis tutorial do need more work. Figure 2 shows the work performed by the sample system and Figure 3 describes the conditions at each node of the system. The nodes represent points in the system, which are at a steady state and for which thermodynamic values may be readily calculated.

Figure 2: The sample program output shows work performed in the system.

```
COMPRESSOR WORK = 138.212 KW
TURBINE WORK = 242.367 KW
NET WORK = 104.155 KW
```

Utility Programs

In addition to the operational modules, which are integrated into larger programs within the S3E environment, a number of utility programs for solving limited mathematical problems are included in MATHPAK and S3EPAK. These utilities are stand-alone programs useful in systems analysis programming; they are not intended to be incorporated into other programs. The curve-fitting routine included in MATHPAK, for example, is a utility designed to allow the user to find a polynomial function of the form

$$y = f(x) = a + bx + cx^2 + dx^3 + ex^n \ldots$$

where a, b, c, d, and e are constants. This polynomial approximates a curve described by the user's datapoints; it allows the user to approximate an arbitrary curve with a specific function.

Conclusions

The value of a product such as PSI/Systems Engineering Software is directly proportional to its ease of use. This product gets passing marks in the easy-to-use department, but there is room for improvement. The INDEX module is painfully slow, and the programs in general suffer from the slowness of BASIC. While BASIC has the advantages of its interactive nature, its small memory requirements, and its widespread use, the language is slow and not well-suited to writing and maintaining large programs. Because of its modularity and potential for analyzing large systems, PSI/Systems' engineerimg software is better suited for languages such as Ada, C, and Modula 2.

In addition to the PC, the software should work with PC compatibles that have the BASICA interpreter from Microsoft. It ran on my Dynalogic Hyperion, as well as on the IBM PC. The product is best suited for practicing engineers, but it also could be useful in junior-level engineering courses in systems analysis. PSI/Systems has some revisions on the way, but even in its present form, this line of engineering software is a worthwhile investment. Overall, PSI/Systems has developed a valuable engineering application for the PC. */PC*

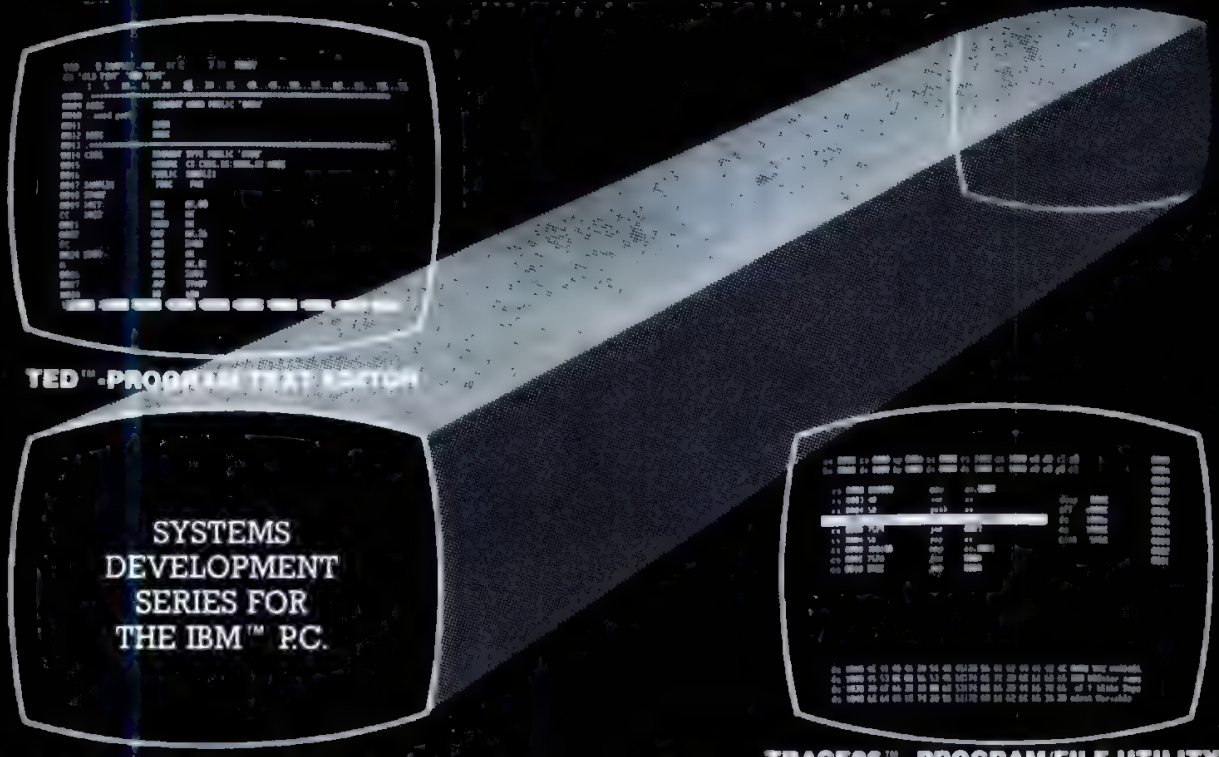
Figure 3: PSI/S3E Node Array shows flow rates throughout the system at each point, or node, and gives a picture of the steady state status of the system.

NODE	1	2	3	4	5	6
H2	0.000	0.000	0.000	0.000	0.000	0.000
H2O	0.000	0.000	0.000	0.000	6.525	6.525
CH4	0.000	0.000	0.000	0.000	0.000	0.000
CO	0.000	0.000	0.000	0.000	0.000	0.000
CO2	0.000	0.000	0.000	0.000	7.250	7.250
O2	50.000	50.000	0.000	50.000	39.488	39.488
N2	188.665	188.665	0.000	188.665	188.665	188.665
FUEL	0.000	0.000	1.000	1.000	0.000	0.000
TOT	238.665	238.665	1.000	239.665	241.928	241.928
PRESS ATM	1.000	3.500	3.500	3.500	3.500	1.000
TEMP Deg-F	70	352	70	345	1345	914
ENTHALPY BTU/hr	8.7871E+05	1.3504E+06	−3.8696E+04	1.3248E+06	1.3250E+06	4.9782E+05

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CIRCLE 494 ON READER SERVICE CARD

The fight for market share in the spreadsheet niche is one of the fiercest in the whole micro software industry. Any new product that has to battle it out with *VisiCalc*, *SuperCalc*, *Multiplan*, and *1-2-3* had better be good. In this market, matching the leaders is not enough; any newcomer has to stand out just to survive.

Report Manager (*RM*), published by Datamension, deserves to survive. Though it does have a few unfortunate eccentricities, *RM* is a spreadsheet that not only performs the standard functions as well as anyone could wish, but comes with a few original features that set it apart from the mass of visiclones. The most notable of these are a three-dimensional, page-oriented workspace and a built-in programming language, which allows the user to set up interactive data-entry files.

Standard Functions

To begin with the standard functions, the basic *RM* spreadsheet is a matrix of data cells with as many as 255 columns and rows. Individual columns may vary in width, and numeric data cells can be formatted—either globally or individually—for integer, decimal, or scientific notation. Numeric cells may contain just about any mathematical, trigonometric, statistical, or logical operator you can think of and can contain up to 127 characters of user-defined formulas.

Within a formula, a data cell is identified by its coordinates: column letter and row number. Cells that are referred to frequently can be given names up to eight characters long, which make the cells much easier to remember. Thus, if a profits figure is the subject of many calculations, the cell in which it is contained can be named "profits," and formulas can include the name rather than the coordinates.

Like all good spreadsheets, *RM* has a replication function, whereby format, contents, formulas, or all three can be transferred to any cell or series of cells within the workspace. For instance, if the job of one numeric cell is to find the standard deviation of a series of data cells two columns to the left, that same formula and spatial relationship can be transferred anywhere on the spreadsheet with a few keystrokes. Whole columns and spreadsheets can be replicated with the same procedure.

This makes it easy to create complex

forecasting models, which redo all subsequent calculations whenever new data is entered. Waiting for *RM* to do all the math is time-consuming, so, in cases where you have several new values to enter in a complex spreadsheet, it allows you to turn off the automatic recalculation feature and

A BUILT-IN calendar can tell you how many days apart June 23 and November 19 are, and on what day of the week they fall.

enter the data. Once you've entered the data, turn on the auto-recalc feature, and *RM* will produce the new results.

The program has a built-in calendar that allows it to do duration calculations; it can tell you how many days apart June 23 and November 19 are, and on what day of the week they fall. Curiously, its date entry format requires that the year portion be entered in four digits. To *RM*, 6/23/83 is a date in the year 83 A.D., making it the easy winner in the archeological spreadsheet market.

Since *RM* workspace can be far larger than your PC's display screen, the program allows you to look at several parts at once. The screen can be split in half, vertically or horizontally, or into equal quarters. Data can be entered and manipulated in any of these windows.

Another way to temporarily shrink the workspace is to "freeze" a few columns or rows, or both. If, for example, you are working on a report that is 200 columns wide and you would like to compare the first column with the 55th, you can freeze the first column onto the screen and move the cursor to the 55th. This way, instead of rolling off the screen to the left, the first column—and only the first column—will stay put, and any other column can be brought next to it. It's as if you had taken a tuck in your spreadsheet.

RM runs in color or monochrome but does not have true graphics capability. It can produce bar charts by stacking graphics characters on top of each other, but nothing fancier. Interestingly, *RM* is one of those rare programs that allow you to access the full IBM character set via the standard Alt key/number pad sequence. This way you could draw pretty borders, write labels in Spanish, or build bar charts out of musical notes. But unfortunately, all this prettiness would turn into garbage on most printers.

There are no tricks to printing a *RM* spreadsheet. You can print by screenful or by any number of columns and rows you choose. *RM* was thoughtfully designed, allowing you to specify a printer initialization string from the keyboard. This way, you can access every font in your printer without any kind of installation procedure. You want your report in compressed italics? Provided your printer has this capability, you just send it the control code from within the program.

Figure 1: A graphic representation of a rudimentary data cube.

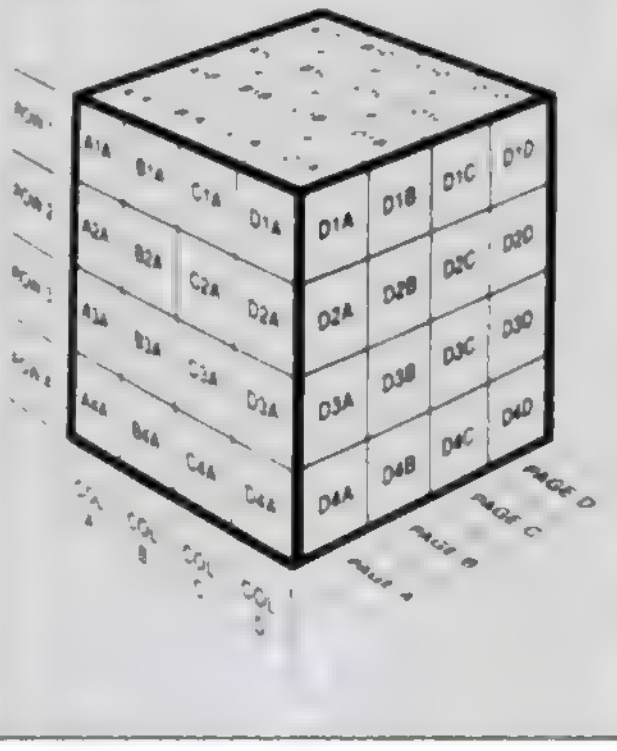


Figure 2: The data cube after it has been split along column B.

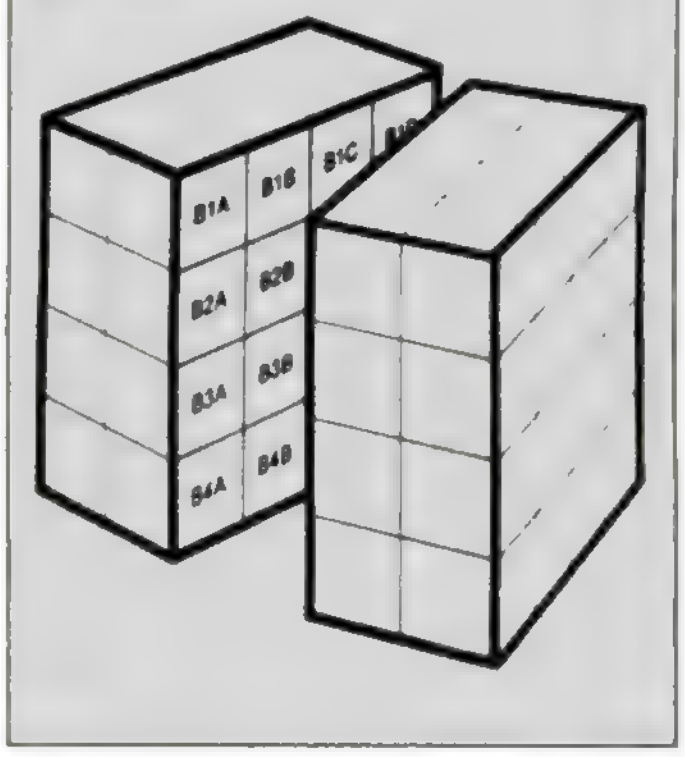


Figure 4: By splitting the data cube at the third quarter column, you can compare third quarter results for each year.

1983	1984	1985	1986
3rd Q	3rd Q	3rd Q	3rd Q
1102	1340	1629	1980
1213	1474	1792	2178
1433	1742	2118	2574
3748	4556	5538	6732
276	335	407	495
1654	2010	2443	2970
662	804	977	1188
2591	3149	3828	4653
1158	1407	1710	2079
463	563	684	832
694	844	1026	1247

The Data Cube

All these features are fine and good, but what Datamension hopes will be *RM*'s big attraction is its three-dimensional approach, which the manual calls "the data cube." In effect, every *RM* spreadsheet is just the first page of a series of up to 255 similar spreadsheets. You can envision the data cube as pages lying on top of one another, just like a stack of paper on a

Figure 3: A printout of one page from a four-page RM data cube, which shows quarterly sales and profit projections for 1983.

		1983	1983	1983	1983
SALES		1st Q	2nd Q	3rd Q	4th Q
Guns	$	1000	1050	1102	1158
Butter		1100	1155	1213	1273
Margarine		1300	1365	1433	1505
TOT.SALES	$	3400	3570	3748	3936
EXPENSES					
Graft	$	250	262	276	289
Salaries		1500	1575	1654	1736
Rent		600	630	662	694
TOT.EXP	$	2350	2468	2591	2720
Pretax Inc.		1050	1102	1158	1216
Taxes		420	441	463	486
NET INC.	$	630	662	694	729

Figure 5: A new first page, containing only labels, is added to the data cube.

SALES	SALES	SALES	SALES
Guns	Guns	Guns	Guns
Butter	Butter	Butter	Butter
Margarine	Margarine	Margarine	Margarine
TOT.SALES	TOT.SALES	TOT.SALES	TOT.SALES
EXPENSES	EXPENSES	EXPENSES	EXPENSES
Graft	Graft	Graft	Graft
Salaries	Salaries	Salaries	Salaries
Rent	Rent	Rent	Rent
TOT.EXP	TOT.EXP	TOT.EXP	TOT.EXP
Pretax Inc.	Pretax Inc.	Pretax Inc	Pretax Inc.
Taxes	Taxes	Taxes	Taxes
NET INC.	NET INC.	NET INC.	NET INC.

desk. Thus, each data cell actually has three coordinates: row, column, and page.

Figure 1 is a graphic representation of a rudimentary data cube, four columns by four rows by four pages. The user moves deeper into the data cube (from page A to page B) by hitting the PgDn key and moves back out with the PgUp key. What makes the data cube concept more than just an added convenience is that *RM* allows you to link pages to one another by cell reference. A formula on one page of the data cube can refer to cells on other pages, so long as the page coordinate is included in the cell reference. Whole pages can be replicated with a few keystrokes, and a change on one page will result in immediate recalculations on all related pages.

Even more impressive is a feature that allows you to split the data cube along any row or column and rotate the newly created surface into view. Figure 2 shows the data cube after it has been split along column B. The newly created surface is made up of every column B on every page in the data cube. For instance, Figure 3 is a printout of a page from a four-page *RM* data cube, showing quarterly sales and profit projections for 1983. There are three more projections on the remaining three pages, one each for '84, '85, and '86—all replicated from the first page. If you cut the cube along the third quarter column, you should be able to see and compare third quarter results for each year (see Figure 4). However, since you are looking straight into the cube along a column of numbers, numbers are all you see. The labels are over in the first column of each page. This problem can't be solved by chopping open the data cube along the labels column, since, in this case, all you'd see would be labels—pretty useless without numbers.

The solution is to add a new first page to the data cube (see Figure 5), which contains only labels. This bizarre-looking screen is a replica of what you would have seen if you had split the original data cube along the first column. Now, however, when you split the cube along the third quarter column, you get not only the numerical data but labels as well.

The result (see Figure 6) is printed with the standard *RM* coordinate grid. Now, what appears as columns A through E actually represents pages from the original cube. Page A, which had nothing but labels on it, is now column A; page B, with 1982 projections, is column B, and so forth. Pressing the PgDn key will now take you sideways through the cube to fourth quarter projections, and the PgUp key to a comparison of second quarters. By designing the data cube to accommodate this kind of manipulation, you can create entirely new reports from the same data by simply splitting the cube—a powerful, sophisticated procedure, which is yours for only three keystrokes.

YOU COULD draw pretty borders, write labels in Spanish, or build bar charts out of musical notes.

Nevertheless, the cube concept is useful only with pages of related data that are identically formatted. Furthermore, it can take a lot of tinkering to get a cube formatted correctly; labels have to be positioned carefully, and they work best when all the columns in a report are the same width.

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Figure 6: The result of adding the new first page to the data cube. Now the numeric data is labeled in the printout.

```
   <,,,,, A ,,,,,,,,,, B ,,,,,,,,,, C ,,,,,,,,,, D ,,,,,,,,,, E ,,,,,,,,,,,,,
0015                        1983          1984          1985          1986
0025---------------------------------------------------------------------------
0035     SALES              3rd Q         3rd Q         3rd Q         3rd Q
0045
0055   Guns                 1102          1340          1629          1980
0065   Butter               1213          1474          1792          2178
0075   Margarine            1433          1742          2118          2574
0085                      ------------------------------------------------------
0095   TOT.SALES            3748          4556          5538          6732
0105
0115    EXPENSES
0125
0135   Graft                 276           335           407           495
0145   Salaries             1654          2010          2443          2970
0155   Rent                  662           804           977          1188
0165                      ------------------------------------------------------
0175   TOT.EXP              2591          3149          3828          4653
0185
0195   Pretax Inc           1158          1407          1710          2079
0205
0215   Taxes                 463           563           684           832
0225
0235   NET INC.              694           844          1026          1247
   `,,,                                                    89.5 (CE ) R001 PA
```

Figure 7: A simple EXEC mortgage analyzer that prompts for data entry, calculates mortgage payments, and prints results.

```
.!
.! MORTGAGE ANALYZER
.!
/V7
/WIDTH 132
.STRING "Enter Your Name " A2
@A.
 P4
.NUMBER "Enter Mortgage Amount " C8
@C8
 P0
.NUMBER "Annual Interest Rate in Decimal Form: " C9
@C9
 P6
.NUMBER "Number of Payments per Year: " C10
@C11
 P1
.NUMBER "Total Number of Payments in Mortgage: " C11
@C11
 P1
@C7
 P0
 [2@+(C9/(12* (1  )+(C9/C10) -C11)
@A1
 +55 IE
/PRC17
.QUIT
```

Something else to worry about is memory: Multiple pages chew up a lot of it. *RM*'s designers were well aware of this problem, though, and have tried to help. While the program is running, it always displays in the status line the amount of memory still available, and the manual offers some tips on how to design reports that conserve memory. The program also includes a handy routine that can be used to calculate how many data cells will fit into the amount of memory you have available. After you have specified the proportion of numeric and text cells and given a few other parameters, you get a report on how many rows, columns, or pages will fit into the cube.

Operating *RM* requires a minimum of 128K RAM, but the program itself takes up more than half that amount, leaving you with only about 60K for your workspace. You can more than double the memory available for data by moving up to 192K, and the program is smart enough to use all the memory you can cram on board.

Built-in Programming Language

Besides the three-dimensional concept, *RM*'s other big draw is its built-in EXEC programming language. Since operating this feature is more complex than splitting data cubes, its appeal is unlikely to be as broad. Still, even for those who won't make full use of the programming language, it is an effective way to create interactive screens, which will prompt naive users for data entry.

EXEC command files are like DOS batch files in that they can contain just about any *RM* command. However, EXEC's 17 BASIC-like statements, such as IF . . . THEN, GOSUB, RETURN, and LET, allow for considerably more sophisticated applications than DOS batch files do.

Figure 7 is a sample EXEC program, named "Mortgage Analyzer." When run, it calls a preformatted data entry template named B:M.TEM (see Figure 8), and prompts for string and numeric variables. It displays all entered data, calculates the payment required to retire the mortgage, and sends the report—in boldface type—to the printer. The result is Figure 9. Since data and labels can be positioned on the screen exactly where you want them to appear on the printout, a similar program could be designed to fill in invoices, write checks, or print labels.

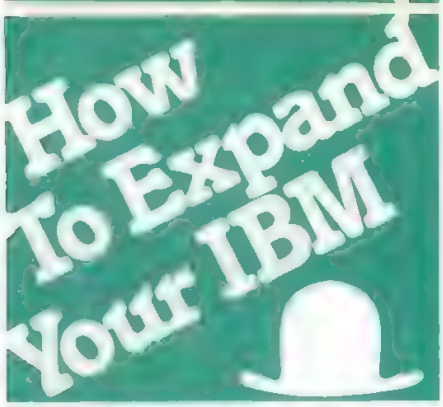
RM comes with a number of precoded EXEC programs far more complex and useful than our little 24-liner. They can be listed, modified, and plundered for good ideas to work into your own EXEC programs. Since they are stored in straight ASCII, programs can be written with EDLIN or with any word processor that handles ASCII files. Like all programming languages, EXEC has its own syntactic eccentricities, but it is enough like BASIC that it can be learned easily.

CURSOR control is one of RM's most unsophisticated features.

So, what is there to dislike about *Report Manager*? Mainly, its ancestry. *RM* originally appeared under the name *VictorCalc* and was designed as a CP/M program for the Vic 9000. A spokesman for Datamension explains that when the program was retooled for the IBM PC, the company designed a "generic" MS-DOS version, which virtually ignores the function keys. Thus, all but one of these ten wonderful keys are functionless.

Unfortunately, it's not hard to think of possible uses for the function keys. To move the cursor to a specific cell, for example, you must type the at sign (@) and then the cell coordinates. The at sign is a two-stroke combination that even practiced touch typists stumble over. "Yes, it gets pretty painful," concedes the Datamension spokesman, who vows that any subsequent versions for the PC will make full use of the keyboard's power. In the meantime, he recommends *Pro-Key*, or any other keyboard customizer, for users who are annoyed at having to hit two or three keys when one should do the job.

Cursor control is in fact one of *RM*'s most unsophisticated features. The arrow keys do what you would expect, but the program doesn't offer anything fancy. The two-stroke command slash (/) Home will move the cursor to the upper-left-hand cell in the first page of the cube, and the slash key (/) End will move it to the lower-right corner of the last page. For anything in between, you're stuck with either that maddening at sign (@) command or a lot



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CIRCLE 591 ON READER SERVICE CARD

Figure 8: A preformatted data entry template is used in the EXEC mortgage analyzer.

```
   <........ A ......................... B ................... C ....... D ............
0015
0025
0035
0045                              PAYMENT REQUIRED
0055                            TO RETIRE A MORTGAGE
0065
0075
0085                    Mortgage Amount
0095                    Annual Interest Rate
0105                    No. of Payment Periods / Y
0115                    No. of Periods
0125
0135                    MORTGAGE PAYMENT AMOUNT:
0145
0155
0165
0175
0185
0195
0205
0215
0225
0235
   -...Enter Your Name                                    CC  R011 (PA )
```

of arrow-key action. Heavy dependence on arrow keys means that the number pad isn't much use. It can be toggled on and off with Num Lock, but constant switching from numbers to cursor control is hardly worth the effort.

Documentation is not one of *RM*'s strong points either. The manual plods along and eventually covers just about everything you need to know, but explanations are unnecessarily terse. It is also inconsistent in minor ways. In the beginning it promises that all keystrokes to be entered by the user will be in boldface type. Most of the time, they are.

By contrast, the context-sensitive help screens, of which there are more than 30, are quite good, though not good enough to replace the manual. Users not familiar with spreadsheets will have to keep all too close an eye to the documentation.

As for the meatier areas of program design, you might quibble about deletion procedures. It takes no more effort (three keystrokes) to wipe out a row or column than to clean out the contents of a single cell. What's more, any column or row removed from the current page is blasted out of every other page in the data cube. You can lose a lot of work when you aim for the wrong row, and if you have been spoiled by fancy word processors, you could find yourself groping fruitlessly for the undelete key.

Three keystrokes is clearly too many for rubbing out a single cell; a function key would do very nicely, thank you. As for rows and columns, a Y/N prompt, while the targeted cells blinked or went into reverse video, would keep tempers cooler. The manual really means it when it says, "Exercise caution before using this [the delete] command."

Figure 9: The result of the EXEC mortgage analyzer.

```
Harold Housebuyer

          PAYMENT REQUIRED
        TO RETIRE A MORTGAGE


Mortgage Amount                          75000.00
Annual Interest Rate                          .12
No. of Payment Periods / Y                    12
No. of Periods                               240

MORTGAGE PAYMENT AMOUNT:                  825.81
```

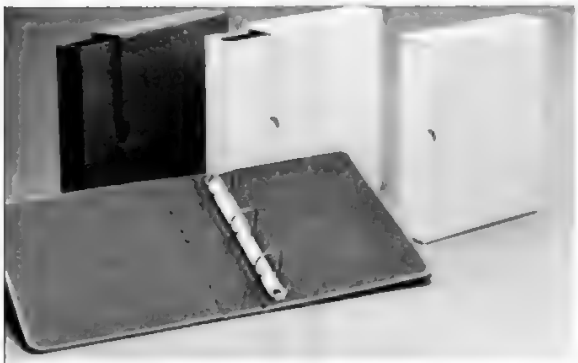
For the most part, though, *RM* is a well-designed program, which the publisher seems committed to support. All registered users are encouraged to call the company's service number (which is supplied after registration), if they get in trouble. Datamension does not try to fob you off onto a salesman when you need support.

The company is also serious about protecting its program. The disk that comes in the original package is fully usable, but copy-protected. Only after you have sent in your name, address, and computer serial number will Datamension send you a copiable version. Each disk has its own serial number, so if the company finds bootleg copies floating around, it will know who to go after.

Report Manager is, after all, a program that the unscrupulous might wish to copy. It is a powerful, versatile spreadsheet, which can hold its own in an item-by-item comparison with any of the big names. It may have a long way to go before it builds up a following, but it is a serious contender in the battle of the spreadsheets. With a few cosmetic changes it could be a real threat. */PC*

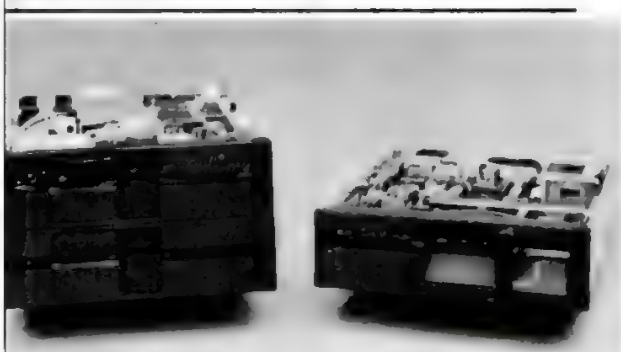
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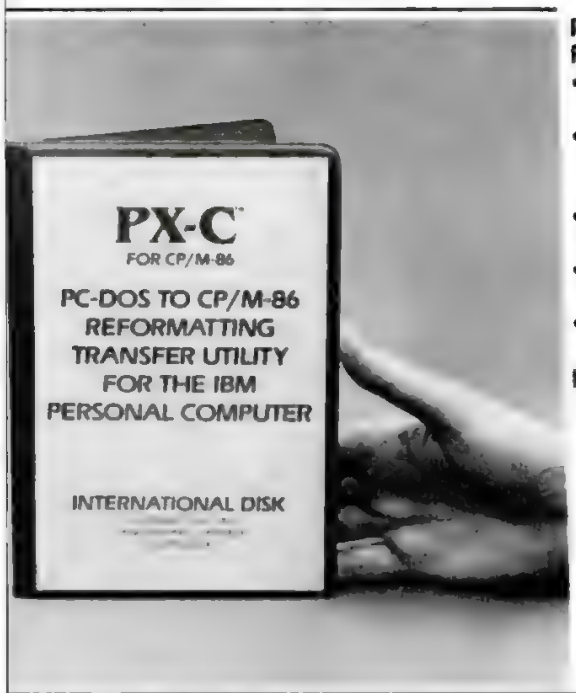


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CIRCLE 284 ON READER SERVICE CA

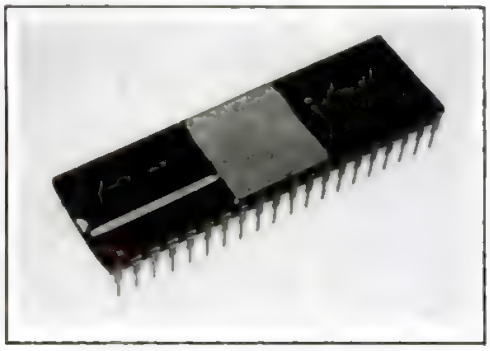
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VisiWord: What You See Is (Almost) What You Get

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List Price: $375
Requires: 128K (DOS 1.1) or 192K (DOS 2.0), one disk drive, video monitor, printer.

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I am not using *VisiWord* to write this review. A deadline as inflexible as a fixed disk looms. I need speed; I need files with which I can telecommunicate to people in the office who don't have *VisiWord*; I need a nice, restful screen that doesn't fry my eyeballs and sear my brain while I'm working. *VisiWord* flunks on all counts.

Until a couple of years ago, most programs for microcomputers were designed by individuals, independent artists who knew what they wanted and figured somebody else would want it too. But, unfortunately, many of them were abysmally untalented or hopelessly uncreative. A select few (Seymour Rubinstein, of *WordStar* fame, and *VisiCalc* developers come to mind) produced software with elegance and personality—commercial products with personal panache, like, say, Porsches.

Now the marketers are taking over. MBAs who wouldn't be caught dead wearing a plastic pocket protector, or even the same shirt two days in a row are conducting research studies to find out what software users want and are doing their damndest to give it to 'em. You don't like programs that take more than 15 minutes to learn? Fine, they'll deliver one that'll get you up and running in 10. You don't want to have to crack a manual? Fine, they'll give you help at the touch of a button.

What results from this approach is a program that makes for a great demonstration to people who don't know any better. "Wow!" these innocents cry. "You mean I can move the words around up there on the screen, and then print out what I just wrote? Neat!"

But when they get the disk home, they may be in for a few surprises. They discover the reason they "learned" the program so quickly was that it left out a lot of hard-to-learn features, which come in awfully handy once you get the hang of them. They discover mysterious stuff in the back of the manual about "printer setup strings" and phone their dealers demanding to know what the word *hexadecimal* means. They finally realize that the program, which insists on triple confirmation of everything but the simplest deletion, is never going to stop treating them like a beginner. But that doesn't bother the marketing guys. After all, the sale has been made.

Design by Committee

VisiWord appears to have been designed by committee—a committee consisting of the Marx brothers (Groucho, Harpo, Chico), the Three Stooges (Larry, Curly, and Moe), Mr. Kludge, and the guy who placed the shift keys on the PC keyboard. What's sad is that a lot of people who don't know better are going to buy this mackerel and think it's caviar. What's sadder is that *VisiSpell*, a companion spelling checker, is one of the most interesting programs I've seen lately—a genuine original in the best sense. And what's sadder still is that *VisiSpell* was apparently designed independently and acquired by VisiCorp—a fact that does not bode

well for the much-trumpeted *VisiOn* integrated package. Maybe they should have called it *DisiWord*.

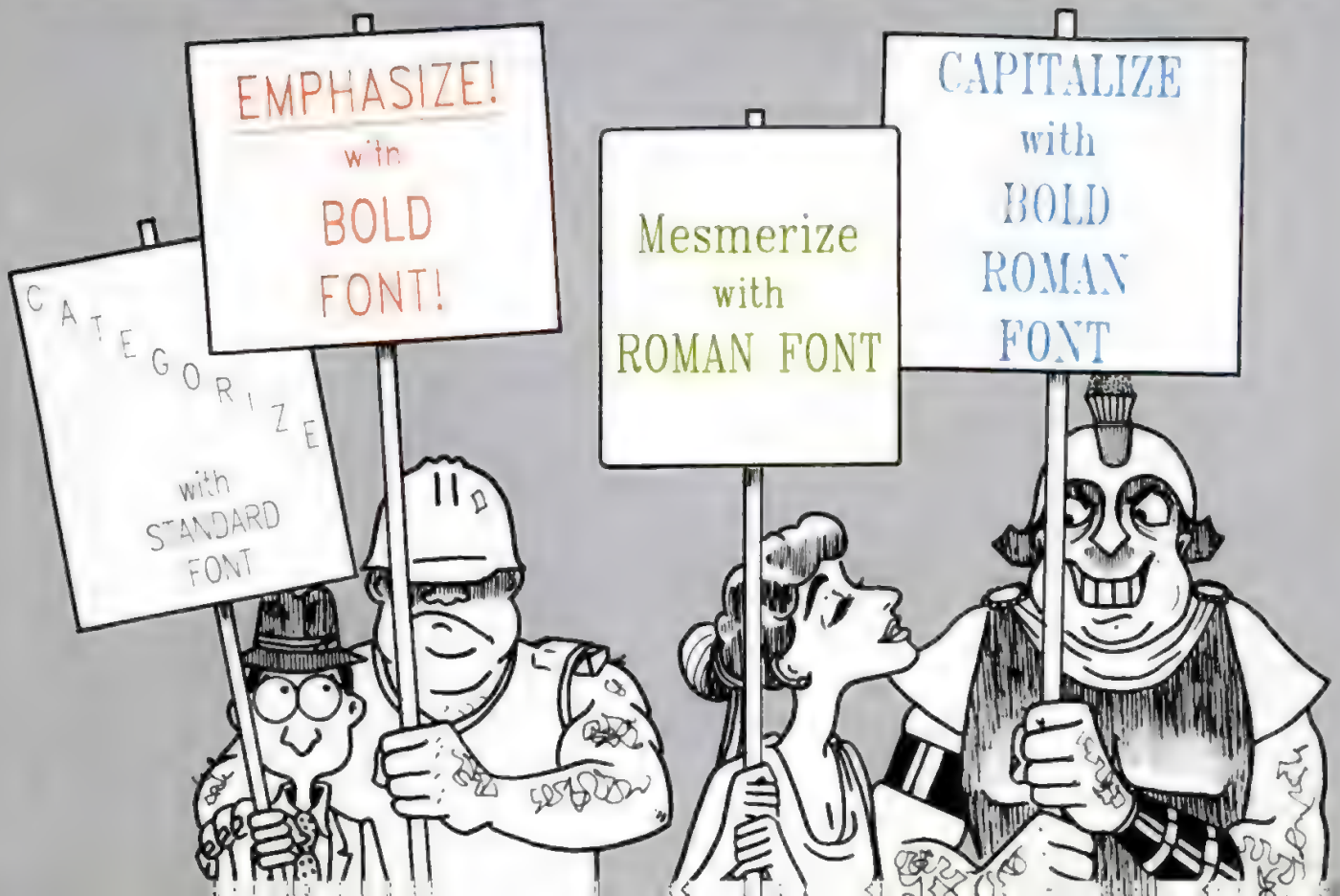
This isn't some prerelease *VisiWord* I'm talking about, either. This is version 1.1, a second release the VisiFolks say they sent out automatically (and, to their credit, gratis) to anyone with the earlier version who sent back the registration card. The new version will run 128K RAM in DOS 1.1, and 192K RAM in DOS 2.0. It may be installed on RAM disks as well as hard disks, but the distribution disk is copy-protected.

Bordering on Insanity

How poorly conceived is *VisiWord*? Take one look at the editing screen (Figure 1) and you'll get a hint. The screen is framed by an undefeatable inverse-video border. It glares at you and glares at you, and there is no way to turn it off. If you use the program with any regularity, the border will be permanently etched into your mind in a matter of months. The glare is a sure cure for a lack of headaches. And it wastes precious screen space.

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If the text were in high-intensity video, you'd at least be able to adjust the contrast to turn down the border's brightness. It's not, and you can't. Believe me, it looks a lot worse in person than it does in a screen shot here. And if you've got a color monitor, you'll have to pry the secrets of multichrome out of VisiCorp's non-toll-free, customer support hotline. As delivered, *VisiWord* comes up in white on black. Period.

How poorly executed is *VisiWord*? The manual tells you that "the *VisiWord* program does not use the Ctrl key, the Alt key, or any combination of those keys with any other key. If you use these keys, the program does not respond."

They wish it didn't respond. Ctrl-left arrow gives you an *s*, and Ctrl-right arrow gives you a *t*. Three more surprises like these and I can type my nickname. You can find your name by hitting various Alt and Ctrl combinations, especially with the function keys. As the document writers recognized, this is not supposed to happen with well-designed programs.

Try some typing. The Lowell Thomas

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CIRCLE 265 ON READER SERVICE CARD

Memorial Cursor enjoys traveling all over the memory map. Often it jumps down to the lower left-hand corner of the screen between each of your keystrokes. Sometimes it goes beneath the L in the word Line on the 24 status line. Just moving the cursor from one line to another often (but not predictably) causes a perceptible and annoying delay. So does using the backspace key. A guy at VisiCorp actually tried to convince me that the wandering cursor was part of the design. Either the guy was attempting the classic prestidigitator's feat of turning a bug into a feature, or the committee member responsible for that part of the project was named Chico.

See It and Get It?

VisiPublicity claims that "what you see is what you get" with *VisiWord*. Not quite. Underlining, boldface, superscripting, and subscripting are all represented on the screen in the same nonprinting way—with inverse video. And you can't double-space your text on-screen. But otherwise, *VisiWord* comes pretty close. The program boasts "dynamic reformatting," which means that when you enter or delete text, the words shuffle around the screen automatically to reflect the current formatting and justification settings.

To those of you who have accidentally produced weird-looking *WordStar* paragraphs you've forgotten to fix with Ctrl-B, dynamic reformatting might seem the answer to an oft-repeated prayer. Not the way *VisiWord* does it. When you're entering text at the end of a document, things aren't so bad. But when you make insertions, particularly at the top of the screen, you can type and type and type and never see a single character of what you're entering, until you stop for a breather or the screen catches up.

For some reason, *VisiWord* gives priority to keeping every part of the screen current but the part you're working on. You don't actually lose keystrokes; you just don't get to see them for a good long while. In justification mode, you may be somewhat unnerved to see many of your text entries appear from right to left.

My little TRS-80 Model 100 has a similar problem keeping the screen current. I've learned to avoid it by performing text insertions only on the very last line of the screen. Don't bother trying this technique with *VisiWord*; the program insists on sending you halfway up the screen when you reach the bottom line.

To give myself an idea of the snail-like pace of *VisiWord*, I hit the Enter key 20 times at the beginning of a document to get a nice, clean screen to work with. I waited an interminable 15 seconds until *VisiWord* was ready to acknowledge my presence again. I then went back to the top and hit the line deletion key (F5) 20 times. Only about ten of the carriage returns disappeared. This was the only time I actually lost keystrokes. Don't ask me why—ask Curly.

You'd think you would get wonderful cursor controls to keep up with these on-screen shenanigans. But you're wrong. Even the rudimentary text editor in my Model 100 gives me more ways to move the cursor than *VisiWord*. The omission of cursor movement by word (let alone sentence and paragraph and scrolling without moving the cursor) might have been acceptable on a 4-year-old Commodore PET. It's unforgivable on a PC. Moving your cursor from the right side of the screen to the middle gives you a glimmer of what eternity must be like. Deletion by word is virtually impossible.

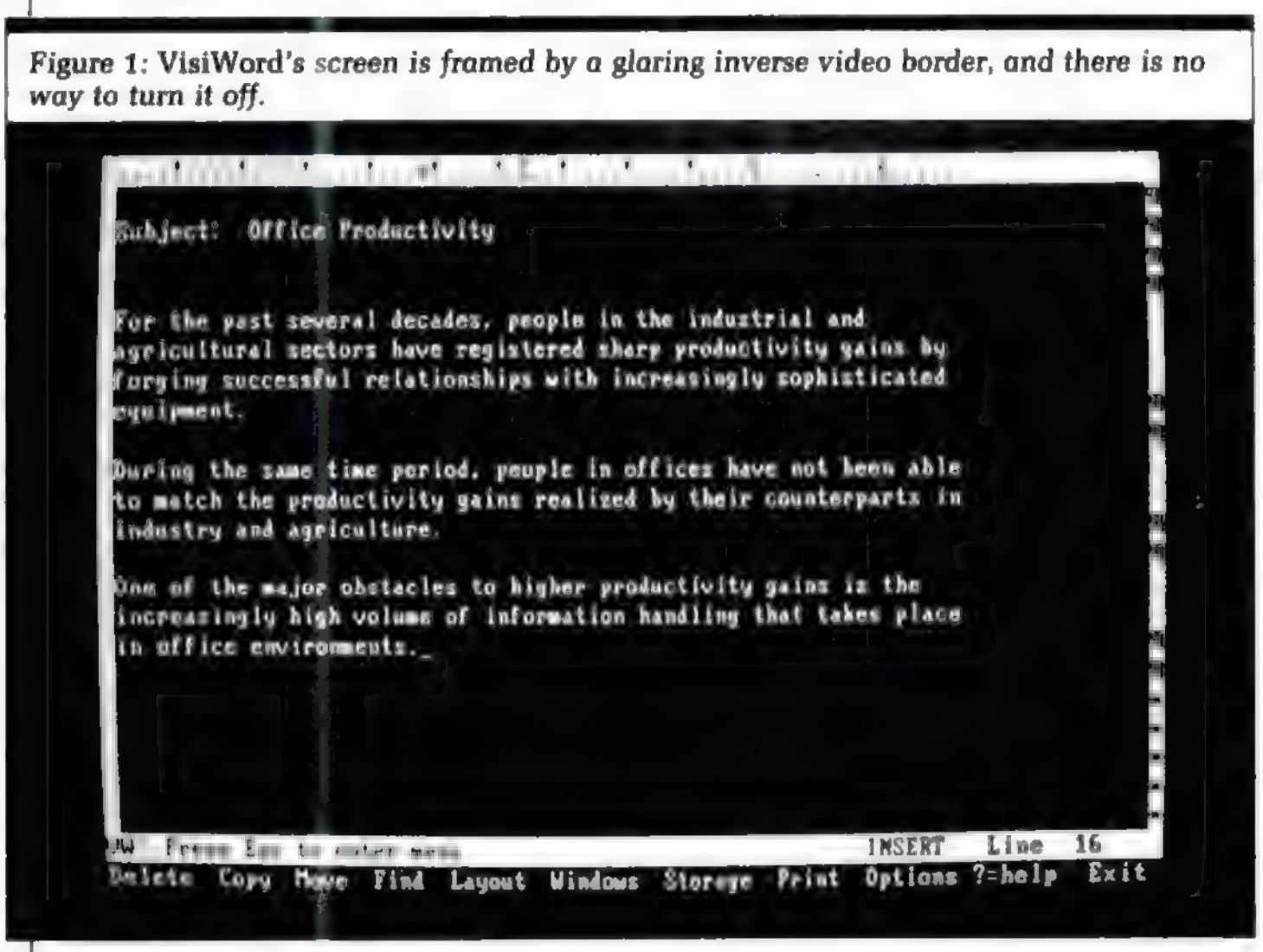
Escape to Menuland

So much for the basics. To do anything fancier, you invariably hit the Esc key, which tosses you into a one-line menu at the bottom of the screen. From there you choose from the available options, either by moving an inverse video cursor across the line or by pressing the first letter of your selection. This one-key approach is something of a VisiCorp hallmark, and it is to be an integral feature of *VisiOn*.

In theory, it's a great idea. In theory, everything you can do is right up there on the screen, and the key letters are mnemonic. But as implemented in *VisiWord*, it's a stiff. Some of the commands (D for Delete) are mnemonic; some (S for Storage) are the second choices when the logical choice (in this case, D for Disk) has already been used. I don't know how many times I hit F for Format instead of L for Layout. In this menu, F is for Find. It's on the Layout menu that F means Format, which means that if you want to do Footers, you have to hit Z. They done ran out again.

The options run across the menu line with no apparent rhyme or reason. The Quit or Exit choice is always at the far right and the question mark (?) or Help option is always directly to the left of it, but beyond that, the order was apparently left to Groucho's educated guess as to which options people would use most. The choice at the left is always the default, and a few of those defaults are exceptionally ill-chosen. The default on the Storage menu, for example, is to Load a file. Granted, you'll probably do that first, but you should be doing a lot more Saves than anything else.

Figure 1: VisiWord's screen is framed by a glaring inverse video border, and there is no way to turn it off.



A lot of typists, including me, prefer using the Ctrl key to Esc, because Esc forces your hand off home position. *VisiWord* adds yet another annoyance. From the editing screen, every time you hit the Esc key—and you have to hit it to do just about anything but type—the speaker chirps at you. The same thing happens with every press of the Home and End keys. And when you hit the "wrong" key from within a menu, you get a loud beep. There's not a thing you can do about it, either. If it were a video game your kid brought home to play on your PC, you'd bite a hole in the disk. Imagine how much fun it would be to have a whole office full of these things, or to work next to the bleeping jerk who's all thumbs! Harpo must've dreamed up this assault on the ears.

The Esc key doesn't perform consistently, either. Usually it takes you into (or out of) a given situation. But from most of the submenus, it often will whisk you back to your text when that wasn't really what you had in mind at all. If the Quit option is available, that's usually what you should use to go to the previous menu. Even after some adjustment, it can remain confusing. And despite the audible click, reaction to the Esc key can be so slow you're often tempted to hit it twice, thereby producing results precisely opposite to those you intended.

Blocks and Blockheads

In at least one way, the block functions available from the main menu (Delete, Move, and Copy) suffer from comparison to the ones available on my cheesy little Model 100. When defining a block in *VisiWord*, you must move the cursor forward through your text. If you invoke the block functions when your cursor is at the end of the file, you'll be able to do precisely nothing. If you ever want to delete the last couple of paragraphs of awful prose you've written, you'll find this a real nuisance.

Once you've got your cursor at the precise beginning of the block you want to deal with, you call the appropriate block function, decide whether you want Text or Column mode, move the cursor to the end of the block, hit the Enter key, and then (except in the case of deletion), move the cursor to where you want the text to go. There's no provision, incidentally, for marking the point where moved text came from so that you can go back and see what happened in the old neighborhood.

AN EXTRA tap on the Enter key, and you can kiss the old file goodbye.

Taking the Yes Option

Deletion is particularly screwy. In Text and Column modes, you're asked to confirm that you really want to make the deletion, but there's no way to review the marked text and check. If your reply is No, you have to start again.

And you may also choose to delete Memory (that is, your entire document). If your text has not been saved, *VisiWord* asks if you really want to make the deletion. Because of the worst chosen default in this program, when you hit Enter, you have chosen Yes, and you have just lost an entire file forever. The same thing happens when you try to Load a file into memory before the current document has been saved and when you use the Z (for Clear, of course) option from the Windows menu. An extra tap on the Enter key, and you can kiss the old file goodbye.

A program that refuses to let you kill a block without positive confirmation, but which has no compunction about letting you trash an entire file by touching the Enter key, seems a perfect example of committee design: Moe likes it one way, Larry the other; sage Curly decides to split the difference. Even the manual writers couldn't believe this one; they tell you taking the Yes option will save your document. They should've taken that option for this part of the manual.

The dedicated deletion keys betray a Marxian influence. F5 deletes an entire line. F6 deletes to the end of the current line. The delete and backspace keys work in the usual ways, but not, for God knows what reason, on forced carriage returns. If you accidentally hit the Enter key, you can't just backspace to get rid of the return;

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you've got to move to the end of the previous line and use F6, or F5 if you didn't think much of that line anyway.

A PROMPT will nag you if the current file is unsaved, and ask if you want to continue on your file-killing path.

But the Undelete key (F9) bears Groucho's logical imprint. Delete a few lines with the F5 or F6 key. Hit Undelete. Wow! Like magic, they are back again, as though they'd never left. Now use the Delete Text option to trash a nice big block. Hit Undelete again. Zilch. Nada. Zip. The Undelete key works to undo only the minor damage caused by F5 and F6, not the potentially major disasters caused by block deletion. In Chico's immortal words: "There ain't no sanity clause."

Savior Text

Pressed to specify the one aspect of this program I'd deem the very worst, I would instantly reply, "saving text." Frequent saves are the only way to make sure your precious words find their way safely to disk before a band of terrorist accordion players demanding freedom for Lawrence Welk blows up your local power substation. Even the supposedly difficult *WordStar* makes saves easy. Type Ctrl-KS and the file is saved, Ctrl-QP, and the cursor is back to where it was in your text. *WordStar* automatically renames your previous version as a backup file, which you can retrieve if you decide you didn't really want to save the current version after all. And while you're waiting for the save to be accomplished, you can look over the text you've just entered.

With *VisiWord*, saving is a chore: Esc, S(torage), S(ave), Y(es), you want to replace the current file Y(es), you *really* want to overwrite it. *VisiWord* makes no backup; it simply overwrites the current file. You could save the file a second time as FILENAME.BAK, but that would require either typing it in each time or selecting it from a directory and then performing an additional (and time-consuming) save.

While all this is happening, you get to look at a screen devoid of everything but a menu. Then you get to hit the Esc key and wait a while to return to your document. After some whirring from the disk drives, you finally get back to your text. But having to abandon it in the first place is an unnecessary distraction, which breaks your concentration. It's just another reason you'll someday be cursing those melodic accordian players when you could have been laughing insouciantly.

The VisiGang's manual keeps congratulating the program on the way it reminds you when a file remains unsaved. If you try to print a file or exit the program, a prompt will nag you if the current file is unsaved, and ask if you want to continue on your file-killing path, but only after the disk has chugged and chugged and loaded the Print or Exit routing. This time the default is, correctly, No. The next question in any well-designed system would be something on the order of, "So maybe you want to save it, huh?" Not in the VisiWorld. The No answer sends the disk spinning, reloads the editing module, and takes you back to your text.

Again and Again

The find-and-replace functions work backwards and forwards, but I found them to be slow, like most other *VisiWord* functions. The Find menu also is rather confusing, offering options that are unavailable until you've chosen others. If you go through Find, then type in a search string (30 character maximum), and then choose the Replace option, you get an error message. Seems you have to choose Next or Previous first.

You can repeat a search with the Again key (F2), but only if you haven't typed in so much as a single character since the previous search. When you press the Again key, the only indication of what's going on is a blinking asterisk in the right corner of the border. And the descriptions on line 25 can be downright misleading. If you select Previous, the option for searching, by typing a P instead of using the cursor, the program does not change the high-

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lighting, leading you to the conclusion that it's searching forward instead of backward. The program will do a global search and replace either automatically or with prompting.

But there's no way to enter a carriage return or special character in a search string, or to search for underlined or boldfaced text. If you want to turn a single-spaced document with two spaces between each paragraph into a double-spaced document with no extra spaces between each paragraph, well, all you do-it-yourselfers will be delighted.

Not for Attribution

Underlining, boldface, superscripting, and subscripting? Why not? To underline, you use the F8 key. With most other word processors, you mark the start and the end of the text you want underlined, and the program does the rest. Not here. Nyuk-nyuk-nyuking fiendishly—Moe took charge of this one.

You have to hold down the underline key as it moves the cursor one slow character at a time through the section you want underlined and marks the text in inverse video. If it's a long section, you can probably polish off a couple of chapters of James Michener's latest blockbuster while you wait. And good luck to you, sir or madam, if you decide you don't want the section underlined after all. You won't find the method in the manual, but if you're smart enough to look for the help screen, you will discover that you may undo the damage either by holding down the underline key the cursor crawls through your text once more or—for more fun—simply type over the underlined text.

Or you can change the underlining to boldfacing, superscripting, and subscripting, which are available from the Layout menu. You can't combine attributes, so if you want something both underlined and boldfaced, or superscripted and boldfaced, you're out of luck. The last one you choose is the one you get. And the only way to find out which attribute has been given to an inverse-video letter is to move the cursor to it and check the status line, which will give you a comment like U/L, EMPH, ABOVE, or BELOW.

Three Sheets to the Wind

Another problem is maximum document size. With customary imprecision, the manual gives you such figures as "25 to 50 typewritten pages" with DOS 1.1, and 20 to 40 of those pages with DOS 2.0, assuming a system with 192K RAM. Working in 128K with DOS 1.1, *Visi* claims an 8 to 10 page maximum. That's not exactly gargantuan. Fortunately—though it can cause significant irritation in the editing process—files can be linked. But only from the end of one to the beginning of another. There's no way to link multiple files from one master file.

THE SHEETS are among VisiWord's best features. They're invisible on the screen; they don't waste screen space that should properly be devoted to your text.

Which brings us to the sheets department. *VisiWord* has more sheets than a January white sale. There are Append sheets, Format sheets, Message sheets, Header sheets, and Footer sheets, not to mention Rulers, which are sheets incognito. You call these sheets up from the Format menu and insert them invisibly (a theta appears in the left hand border) into the text.

With the exception of Append sheets, which are valid only in the very last line of a document (*VisiWord* graciously will let you insert elsewhere, where they have absolutely no effect), sheets control the formatting of a document from the point at which they are inserted to the next appearance of a sheet of the same kind. Format sheets let you change line spacing, justification, character pitch, and page numbering. Header and footer sheets let you specify headings and footings of up to three lines each. Rulers let you adjust margins and tab stops. Append sheets let you invoke another file from the current file. And Message sheets let you send a message to the screen at print time.

The way you set these things isn't terribly difficult, and you may insert all five kinds of sheets on one line. But you're supposed to insert a sheet only on a line immediately following a hard carriage return. All options but the rulers let you work on a sheet even when the cursor isn't on such a line; only when you finally try to insert the sheet into the text do you get an error message. The rulers simply refuse to do your bidding until you realize your mistake.

Despotic Rulers

In the rulers, *VisiWord* requires you to use the Indentation option instead of Margin to set the left margin. The Ruler option also produced a reproducible system crash. The first time, when I chose a column width of 255 (the program's supposed maximum) and hit Esc, *VisiWord* burped and sent me into, of all things, Cassette BASIC. The second time, *VisiWord* sent a disk drive spinning merrily for 15 seconds or so before offering me a PC PARITY CHECK 2 error message on the screen. I was rather chagrined that it forgot to ask me if I had saved my file before these things happened; three pages of text disappeared as swiftly as if Doug Henning had performed his art on them. The whole committee probably knocked its heads together on this one.

Headers and footers are easy enough to enter, but they offer possibilities for trouble. You get three fields, each with 40 characters to play with: one justified left, one right, and one center. If you're not careful, the text you enter in one field can overlap with another when it goes to your printer. To get a simple header of more than 40 characters, with a page number at the right, will require some careful counting. If you're working on a document wider than 120 columns and require more than 40 continuous columns of header (in a report incorporating a spreadsheet, for example), too bad for you. There's no provision for book-style page numbering to appear alternately at the right and left corners of the pages.

But the sheets are among *VisiWord*'s best features. They're invisible on the screen; they don't waste screen space that should properly be devoted to your text. And *VisiWord* stores the formatting information in the file with the text, which helps it keep track of such features as centering (accomplished with one touch of the F9 key) and paragraph indentation (F4), even if you decide to change the mar-



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gins. This is one place many other screen-oriented programs, including *WordStar*, fall down on the job. Reset the margins in a *WordStar* file with centered or indented text, and the centered text won't automatically be centered or indented anymore.

VisiWord also gets high marks for its page-break display. A row of diamonds on the screen delineates page breaks, which you can force with the F3 (New Page) key. As far as I can determine, the display remains accurate even when the page length or heading margination changes within the document—something *WordStar* loses track of.

On the other hand, the only way to tell what page you're on is to start at the beginning, scroll through, and count the rows of diamonds. *VisiWord* will give you a word (but not character) count. To get it, along with information on how much text is above and below the cursor and how much memory remains for your document, you hit Esc, S(torage), M(aintenance), U(sage) and wait about 10 seconds. It then takes about 5 more seconds to get back to your text. Nowhere in the manual is there any explanation of how *VisiWord* decides what's a word and what is not.

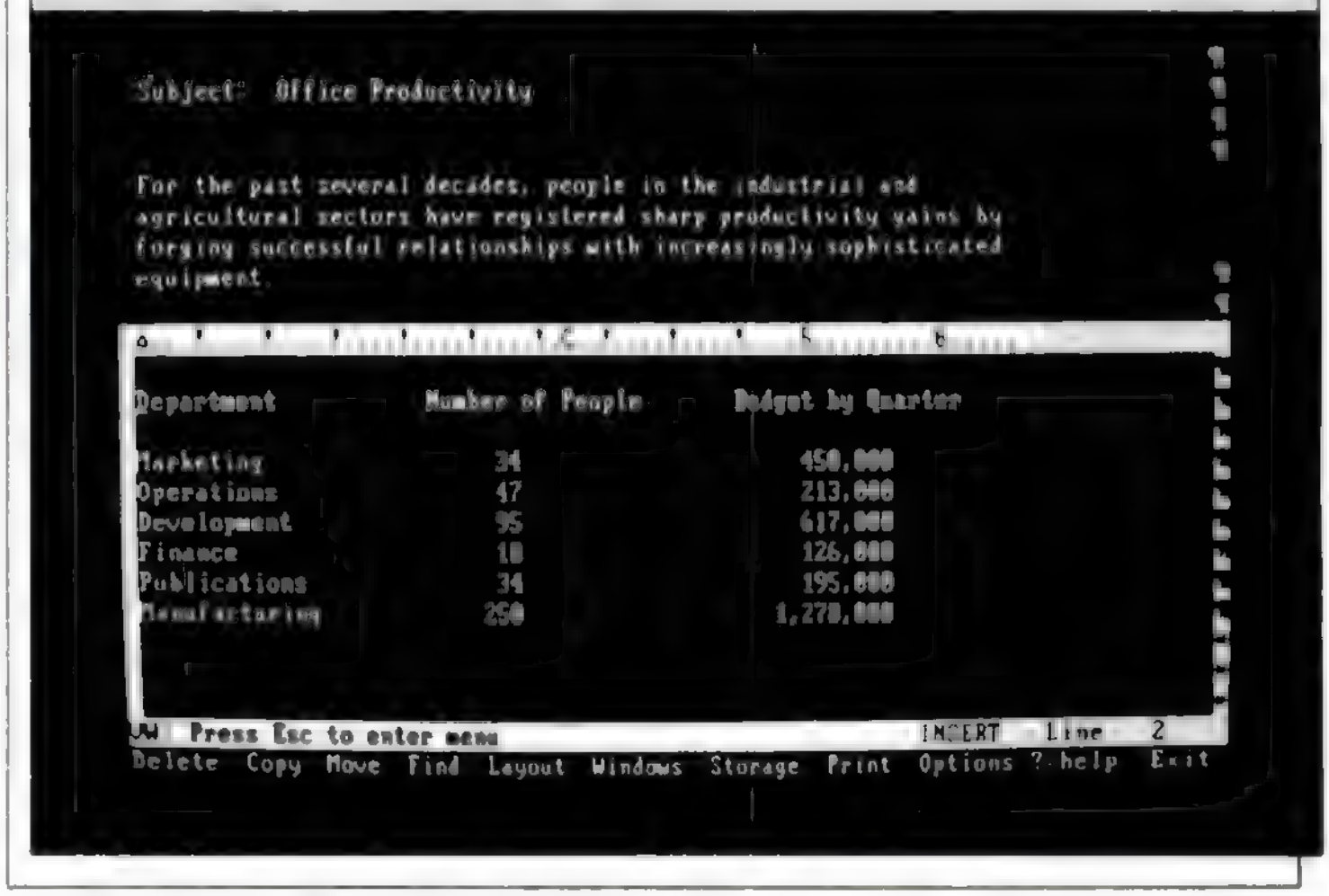
It Does Do Windows

VisiWord may not have every feature you want, but it does do windows. This is the feature I miss most in *WordStar*. The advantage of windowing is that you can split the screen and work on two (or, in some other systems, more) files at once. This can be great for writing an article while scrolling through your notes or merging part of one file into another. But I hope *VisiWord*'s implementation doesn't become a standard.

When you decide to set up *VisiWord* windows (press Esc, W(indows), O(pen), you can split the screen horizontally at whatever line you choose. The bright border then moves down to create a lower window, leaving whatever text remains on the top of the screen. But only the lower window is "active" (Figure 2). You can't do anything in the upper one unless you switch the active window (press Esc, W(indows), S(witch), at which point the text on the bottom becomes inaccessible until you switch back. Marking text in the active window and moving or copying it to the other window works exactly the same way as a regular move or copy, with one added prompt, which asks where the text is going.

It would be nice if you could at least scroll the inactive text without switching windows, but *VisiWord* won't let you. Switching windows takes only three keystrokes, but with one empty window and one 5-page file, *VisiWord* took 7 seconds just to make the switch—one more irritating delay. And if you type on the bottom line, *VisiWord* insists on sending you halfway up the window even if that window

Figure 2: A VisiWord screen with a windowed section. The text in the top half of the screen is not active.





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measures only five lines high.

Using the windows feature also can lead to a certain amount of confusion. Since you can have the same file, with the same filename, in both windows, it's by no means difficult to save the wrong version and overwrite the one you really want. *VisiWord* prompts you that a file is unsaved if you try to close out a window before saving it, but I somehow managed to wipe one window out by accident—probably because of those weird defaults. And there's no way, short of calling up the Storage menu from the active window, to find out the name of the file in either window.

You also have to leave your text and go out to the Storage menu to load, rename, or delete a file. You can't copy a file to another filename, unless it's the file you're currently working on. And the directory, also available only from the Storage menu, comes up in one unalphabetized column that you have to page through with the PgDn and PgUp keys—a miserable approach compared to *WordStar*'s alphabetized multicolumn directory. The Storage menu also will let you format a disk; but, contrary to standard PC terminology, *VisiWord* calls the process "initializing."

You also can read an entire file into another from the storage menu. You receive the query, "Is the cursor correctly positioned in the text?" But, the only way to find out is to exit the function, go back to the editing screen to check, and start over. We are not amused, Groucho.

One-Liners

Decimal tabbing is available with the F1 key. Everything will be printed from right to left from the tab stop until you type a decimal point. It's handy for lining up columns of numbers.

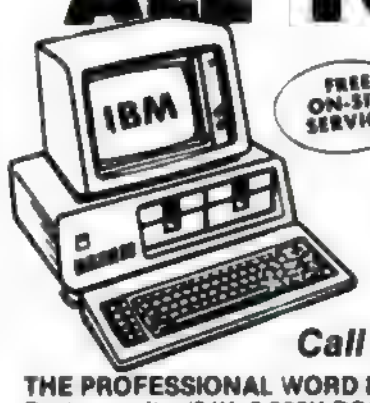
Words connected by hyphens will not be separated at line breaks. That's fine for people submitting manuscripts to printers, but for everyone else it's the wrong choice. The procedure for entering soft, or ghost, hyphens is awkward, and there's no hyphenation aid even in the automatic justification mode. Nor is there a margin release to let you stick a character or two outside the defined boundaries.

Help screens are available from most menus. In some cases they're more useful than the manual, though occasionally they lack detail on the specific process you're trying to perform. If you ask for help while entering an Append sheet, for example, you get only a general and unhelpful screen applying to the entire Format menu.

You can define your own start-up settings for *VisiWord* by creating a special blank file with Format and Ruler sheets and saving them it to disk. If the file isn't blank, you can save it anyway; to what effect, I know not.

You can also change the default disk drive. But if you don't have a fixed disk you can't change both. The two necessary files won't fit on the crowded distribution disk. In fact, according to the documentation, the format and ruler defaults won't

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always fit either. The committee must've remembered all the laughs they got from those THINK signs with the tiny *K*s crammed in at the right.

File Follies

VisiWord produces some of the screwiest files I have ever seen. If you try to TYPE them from DOS, you'll see all sorts of weird, happy faces and hear beeps and the like, which the program uses for internal housekeeping. But somebody also decided to use ASCII 26, the End of File character, for a purpose other than to mark the end of the file. This may cause you no end of grief if you're trying to modem a file and your communications software quits at the first ASCII 26, or if the other guy's software strips out end-of-file characters. You'll have to print the file to disk to transmit it, thereby losing important formatting information.

What You Get Is What We Give

Now, for the Print menu. First point: If your printer isn't on the list that *VisiWord* supports (Figure 3), you may as well go elsewhere. If yours falls under the category of "Other Printer" or "Other Printer with Setup Strings," no character attributes of any kind, from underlining to superscripting, will be available to you via the standard methods, and you're likely to have trouble doing such things as double-spacing. True, for attributes, you may define up to four custom "printer setup strings" in a Format sheet and then use them from the Format menu as you would normal character attributes. In most cases, however, you will need two of these custom strings for each attribute—one to turn the attribute on and the other to turn it off. Using this setup will be even more annoy-

Figure 3: Printers supported by VisiWord. If yours isn't specifically mentioned, you may have trouble printing.

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Epson MX/FX - (80 or 100) with Graftrax-plus

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IBM 80 CPS Matrix Printer

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NEC Spinwriter model 7710

NEC Spinwriter model 7730

NEC PC-8023A-C

Brother HR-1

Okidata (Microline) 82A or 83A

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Other Printer

Other Printer with Setup Strings

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ing than the standard methods, and potentially devastating, should you forget the "off" marker, which on-screen will look identical to the "on" marker.

If you do have a printer that *VisiWord* supports, you can use these "printer setup strings" for such things as expanded or compressed characters. If not, forget it. I don't even want to think about what I would have to do to get my unsupported IDS Prism to underline text this way. That's one more reason I'm not writing this with *VisiWord*.

I'm at a loss to decide how good *VisiWord* is even *supposed* to be at printing, since the documentation omits most of the information needed to find out. Will the program do microspace justification? Will it do true proportional spacing? The manual doesn't tell you. But since there are no options for adjusting any of these possibilities, my guess is you're not going to have much control over them, unless you send a "printer setup string" at the beginning of your document. Maybe VisiCorp should call this program "What you get is what we give you."

At press time, a VisiGent informed me that microspace justification is indeed supported on printers than can do it (something I was unable to confirm with the equipment available to me), and explained that a customer service line will supply debug patches to let unsupported printers print character attributes. He suggested that users of unsupported printers first try the Okidata Microline 82 option, closest thing to "plain vanilla." When I tried it with my Prism, I got underlining and boldface, but I also got a character width I hadn't specified. Close. But no cigar.

Limited Options

VisiWord will print only the document currently in memory, with the option of printing either to a printer or to a disk. In printing to disk, you have the choice of creating a fully formatted image of the document complete with printer controls, or a PC-DOS file, which eliminates printer controls and such things as headers and footers.

The DOS-file option could be a valuable feature for transporting *VisiWord* files to other programs, but the DOS files it created when I tried it all had two carriage returns and one line feed between each line—not exactly a standard format. Not even the simplest three-line batch file created in that format would function properly, and the extra line feed is a mess to clean up, even with a program like *WordStar*. If you're interested in a program editor, look elsewhere.

There's no provision for printing multiple copies automatically. You may begin printing either at the beginning of your text or at the cursor position. If the cursor is near the end of a longish document, however, *VisiWord* will seem to have died. Bear with it; it's just looking through your text at its usual tortoiselike pace. Some sort of message to fill the empty screen might have been nice.



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You do get a message when the print spooling feature goes into action, though. Since it works by formatting the file and writing it to disk, you wait until the process is through. Once you're allowed back to the editing screen, the functions there are even slower than usual. Mr. Kludge's participation is evident here.

When you return to your document from the print menu, you find the cursor somewhere in the first few lines. Considering that the program has to know where the cursor is in order to begin printing on the current cursor line, this must be just another of Curly's little boffs.

Want some sort of form-letter function? Buy *VisiFile*. But don't rush. According to the *VisiWord* documentation, you can't include character attributes in any merged document. So much for emphasizing that fantastic **new** feature.

Want to print a speech with triple spacing? No can do.

Wanna Buy a Manual?

The short "QuickStart" tutorial takes the novice user only through the simplest aspects of creating a document, but unless that user has an IBM printer, the document won't turn into hard copy without assiduous study of the manual's appendixes. Even for the simplest move and copy procedures, the new user will have to turn to the manual.

That boxed manual is somewhat taller than IBM's. Typeset and indexed, it isn't laid out in tutorial fashion, and, when it's not repetitive, it's often incomplete. The illustrations aren't bad, but there aren't enough of them, and examples of the various features are few and far between.

VisiCorp will be happy to sell you a book called *VisiWord Word Processing for You and Your Business*. It's published, naturally, by VisiPress, and it includes a disclaimer nearly as long as IBM's. Written in humorless manualese, it offers some (but by no means all) of the step-by-step directions that should have been in the free documentation, along with arcane applications you will never use in your lifetime. At $18.95, it's a shameless step backward in extracting extra cash from users and a tacit admission that *VisiWord* isn't really all that easy to use, after all. But *VisiCalc* and *VisiFile* users may need it to

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figure out how to VisiInterface with *VisiWord*. The *VisiWord* manual gives *VisiCalc* a scant page and a half. You have to print your *Calc* files to disk before you can read them into *VisiWord*. DIF files won't work.

Except for its information about sheets and start-up settings, the quick-reference card that comes with *VisiWord* doesn't provide as much information as the available help screens. A plastic overlay for the function keys is helpful once you manage to keep it from interfering with them.

Where to Put It

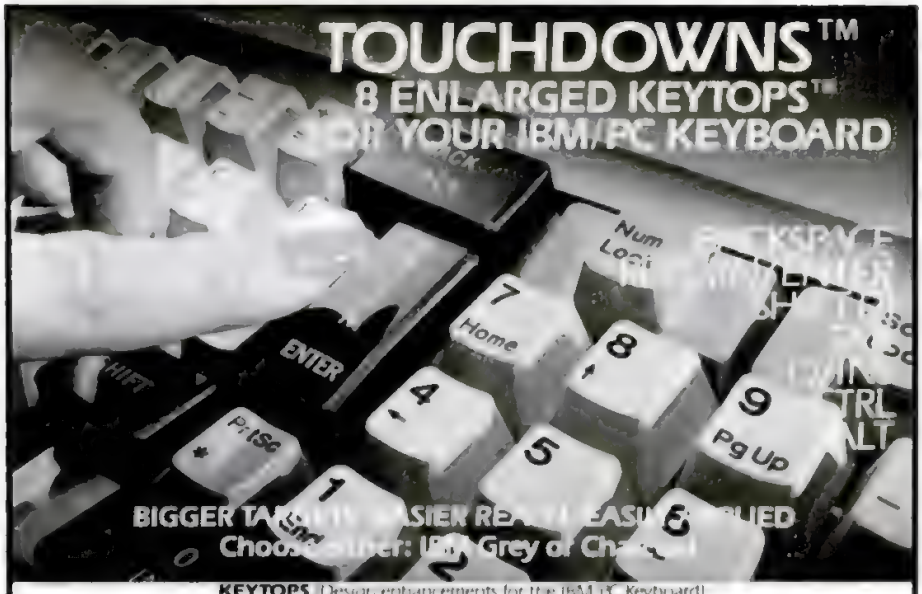
The 1.1 version of *VisiWord* can be installed on a fixed disk or on RAM disk by using a batch file provided on the disk. Unfortunately, you see performance improvements only when you move from the main menu to another menu and back again, which tends to be slow and noisy with a floppy. Editing speed will not improve one iota, since *VisiWord* loads the whole document and the text-editing module of the program into memory. And if you're thinking about diskcopying your RAM disk onto a floppy to make yourself a backup, think again. Using the copy will get you only an error message and a loud raspberry.

Though the documentation doesn't mention it, the VisiFolks inform me that *VisiWord* does *not* support the DOS 2.0 Path function. If you want to edit a document on hard disk, it has to be in the same subdirectory as the *VisiWord* files. This from a "new generation" program?

VisiCorp says it will give registered users updates of the program for $20 each, but only one copy per customer. And if you're thinking of upgrading to *VisiOn*, you'll be charged $50 or the difference between your version of the program and the *VisiOn* version, whichever is greater.

Goodbye Forever

Even leaving *VisiWord* is an exercise in frustration. Exit to DOS and you're prompted to Insert DOS disk in drive A. For some reason, the manual does not want you to put COMMAND.COM on the single-sided program disk to obviate the problem. Apparently, if you do, you may run out of room for some of the default files *VisiWord* creates. Strangely enough, I got COMMAND.COM to fit. Beats me. The VisiFolks inform me that, if you order the one backup disk to which you are entitled



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(for an extra 20 bucks), you may specify a double-sided one with room for such things as COMMAND.COM and AUTOEXEC.BAT files. Too bad there's no mention of it in the documentation.

Speaking of which, the Exit options include something called Start-another-product. This option, undocumented by the manual, turns out to perform the equivalent of a full three-key system reset—a major surprise if you happen to have files out on RAM disk. You can then report your loss to the Missing Files Bureau, which will shake its head sadly and tell you nothing can be done. This option, in a fit of VisiModesty, just happens to be the default; hit the Enter key and play "Wipeout."

WHILE VisiWord is looking through your text at its usual tortoiselike pace, some sort of message to fill the empty screen might have been nice.

I depend on my word processor every working day. I wouldn't be caught dead using a disk that's copy-protected, let alone one that's not write-protected, which is the situation here. And I have half a dozen custom-modified versions of *WordStar* for various specific tasks. With *VisiWord*'s two-to-a-customer policy, that's impossible.

I don't have to think very hard to think of the many things *VisiWord* doesn't do—things like footnoting, indexing, multiple windows, and letting you insert nonprinting comments in a file. Enough said.

I'm still curious about *VisiSpell*, though. The program is distributed by VisiCorp but copyrighted by an outfit called "fut•heuristix" (now, I ask you, could I have made that one up?), and what I've seen so far looks promising. I'll let you know next month whether the promises turn sour. But when it comes to *VisiWord*, take the advice that often appears on its status line: "Please wait." */PC*

COINS and Coin Management System are two radically different software programs to manage coin collections for both the hobbyist and the investor.

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List Price: $95; optional quarterly updates, $25 each.
Requires: 64K, two disk drives, printer.

CIRCLE 791 ON READER SERVICE CARD

Coin Management System
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Sunnyvale, CA 94086
(408) 733-1938
List Price: $75
Requires: 64K, one disk drive, printer optional.

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When I started collecting coins as a kid, close to 20 years ago, my friends and I would mount bikes with a few dollars in our pockets and pedal down to the local banks. There, we'd trade in our dollar bills for rolls of pennies, nickels, or dimes—we usually didn't have the $10 for a roll of quarters. Then we'd remount our bikes and head for a quiet spot, where we would go through the rolls looking for coins to bolster our small collections. If we were lucky, a roll might yield two or three of the coins we needed. We'd replace the coins we took, rewrap them, write our names and addresses on the wrappers so we wouldn't get the same roll back another day, and head back to the banks to trade them in for more rolls.

Sometimes we'd travel to a coin dealer or coin show to fill in an empty spot in our albums, but that didn't happen often. Mostly, we counted on those rolls from the banks and whatever coins showed up in our hands as change from store purchases or from the school cafeteria.

Perhaps this was an unscientific way to build a collection. But in those days, collecting coins was just a hobby for us, not a profit-building investment that would enable us to buy a car, go to college, or even allow for a job-free, leisurely summer vacation.

Now I realize that numismatics is big business. Financial magazines and newspaper business pages carry ads from fiscal wizards advising readers to consider rare coins as investments. Their literature carries almost-too-good-to-be-true tales of how a particular coin quietly appreciated in its owner's safe deposit box.

The system that coin collectors use to keep track of their acquisitions has changed, too. At one time, the collector evaluated each coin's condition, laboriously checked its value in a hobbyist publication or annual catalog, wrote the results on lined sheets of notebook paper, and systematically put each coin on a different page, according to its country of origin, denomination, year, value, condition, and so forth.

But now, in the age of the microcomputer, PC owners have a choice between two radically different software programs for inventorying and recording their coin collections.

Fill in the Blanks

COINS, which is an acronym for COmputerized INventory System, can be described as a fill-in-the-blank program that is best suited for those with rather standardized collections. If you specialize in ancient Greek and Roman coins, 20th century Canadian dimes, or even United States paper money, its benefits are limited. The strength of *COINS* is in its built-in market value file, which automatically calculates the value of any of 1,600 different coins, according to denomination, year, and condition. A quarterly update allows you to adjust the values in the market value file without having to individually alter the record of each coin.

COINS comes with one diskette and 28 pages of documentation. The current pamphlet, printed on yellow paper, is at first a bit distracting for IBM PC owners because of its references to the TRS-80 Models I and III, the computers for which the software was originally written. A new manual will be developed, according to *COINS* author Marvin Mallon, but, in the meantime, you get a two-page photocopied insert with step-by-step instructions on how to transfer DOS 1.10 and how to copy your *COINS* disk onto a back-up diskette. The insert also explains the use of the PC's F1 through F5 as dedicated function keys for the program. A plastic overlay card, which fits around the function keys, indicates the specific uses of the keys F1 through F5. The rest of the operation proceeds according to the instructions given for the TRS-80 models.

COINS IS oriented toward the collector or investor with a relatively standard collection.

Only five pages of documentation explain how to run the menu-driven program, but that's enough to make most things clear. The menu includes six options (see Figure 1), starting with "Coin File Maintenance." The other options allow you to print reports on current value, purchases by year, sales by year, or a complete inventory, known as an "all entries report." Option 6 ends the program and closes all files.

Your Work Begins

With the first option, "Coin File Maintenance," you begin the tedious, repetitive process of entering each item in your collection. The query line at the bottom of the screen gives you four choices: (A)dd, to create a file; (C)hange, to alter an existing file; (I)nquire, to review a file; or (M)enu to return to the main menu. According to its manufacturer, Compu-Quote, *COINS* has the capacity to store approximately 10,000 records, provided you use two drives and double-density, double-sided diskettes.

The file maintenance screen (see Figure 2) contains 14 fields, which appear on the screen as blank lines. To add a file, you fill in some of the blanks and others will be automatically filled in for you. Each coin is considered a separate record, and the program will automatically assign a record number when you add a new file. *COINS* prompts you to "Enter Standard Coin Number (0 If None)". Standard coin numbers are listed in the final 14 pages of the pamphlet for 1,600 different types of coins, including: Flying Eagle, Indian Head, and Lincoln cents since 1856; Liberty Head, Buffalo, and Jefferson nickels since 1883; Barber, Mercury Head, and Roosevelt dimes since 1892; Barber, Liberty, and Washington quarters since 1892; Liberty Seated, Barber, Liberty Walking, Franklin, and Kennedy half dollars since 1839; Morgan, Peace, and Eisenhower dollars; Susan B. Anthony dollars from 1878 to 1981. Accommodation is made for common variations. For example, there are separate numbers for both the small date and large date 1960D penny. Numbers are provided through 1990 to accommodate future updates, but if you enter standard coin number 1064, representing the 1990S Washington quarter, you'll get the face value of the coin, in this case, 25 cents.

The greatest weakness of *COINS* is immediately apparent if you have several coins of the same year and denomination in the same condition. Unfortunately, the program is incapable of repeating identical entries—you must reenter the same information for each such coin. As an alternative, you can use the description field to indicate how many of that particular coin you have, but the value calcula-

Figure 1: The main menu of the COINS program.

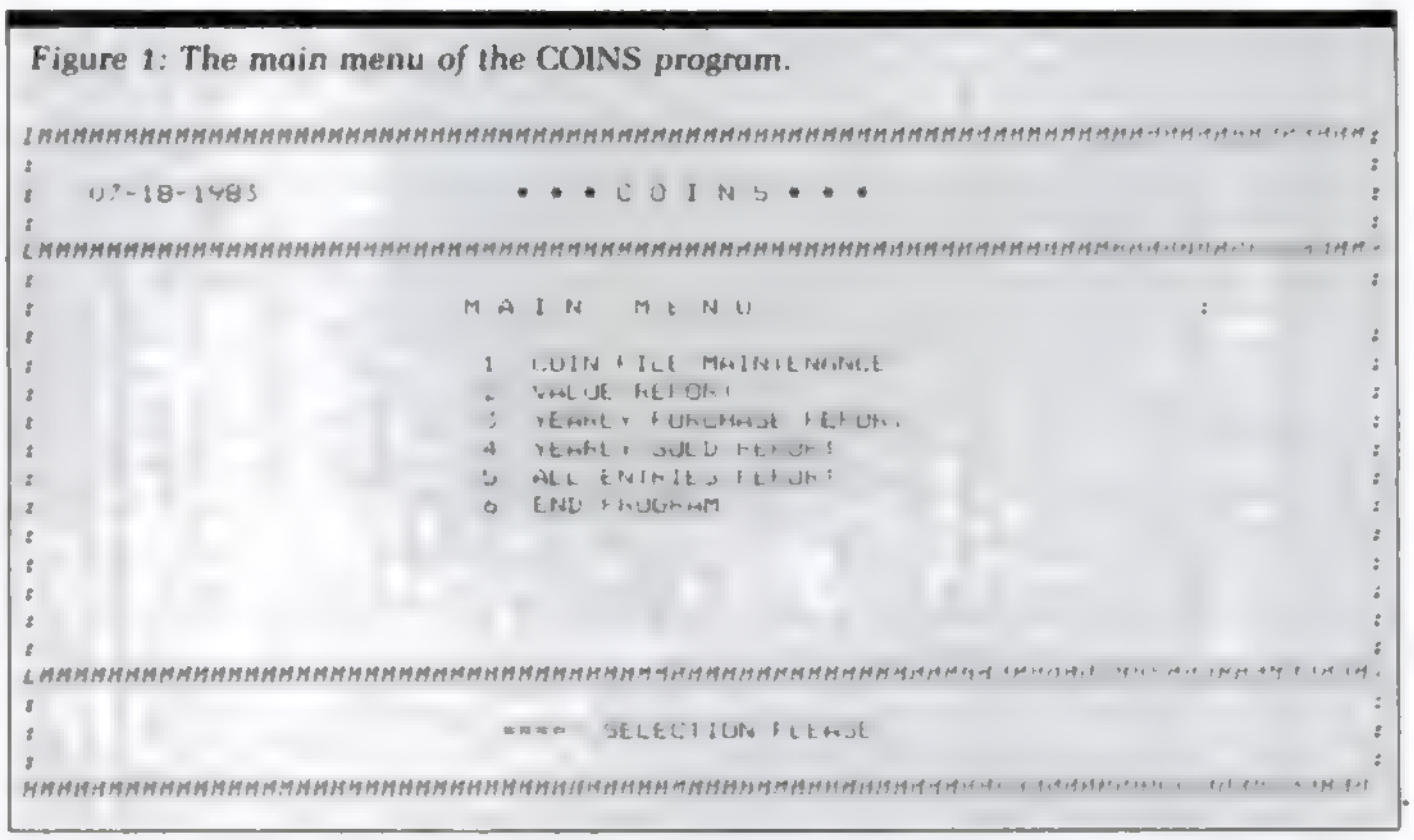
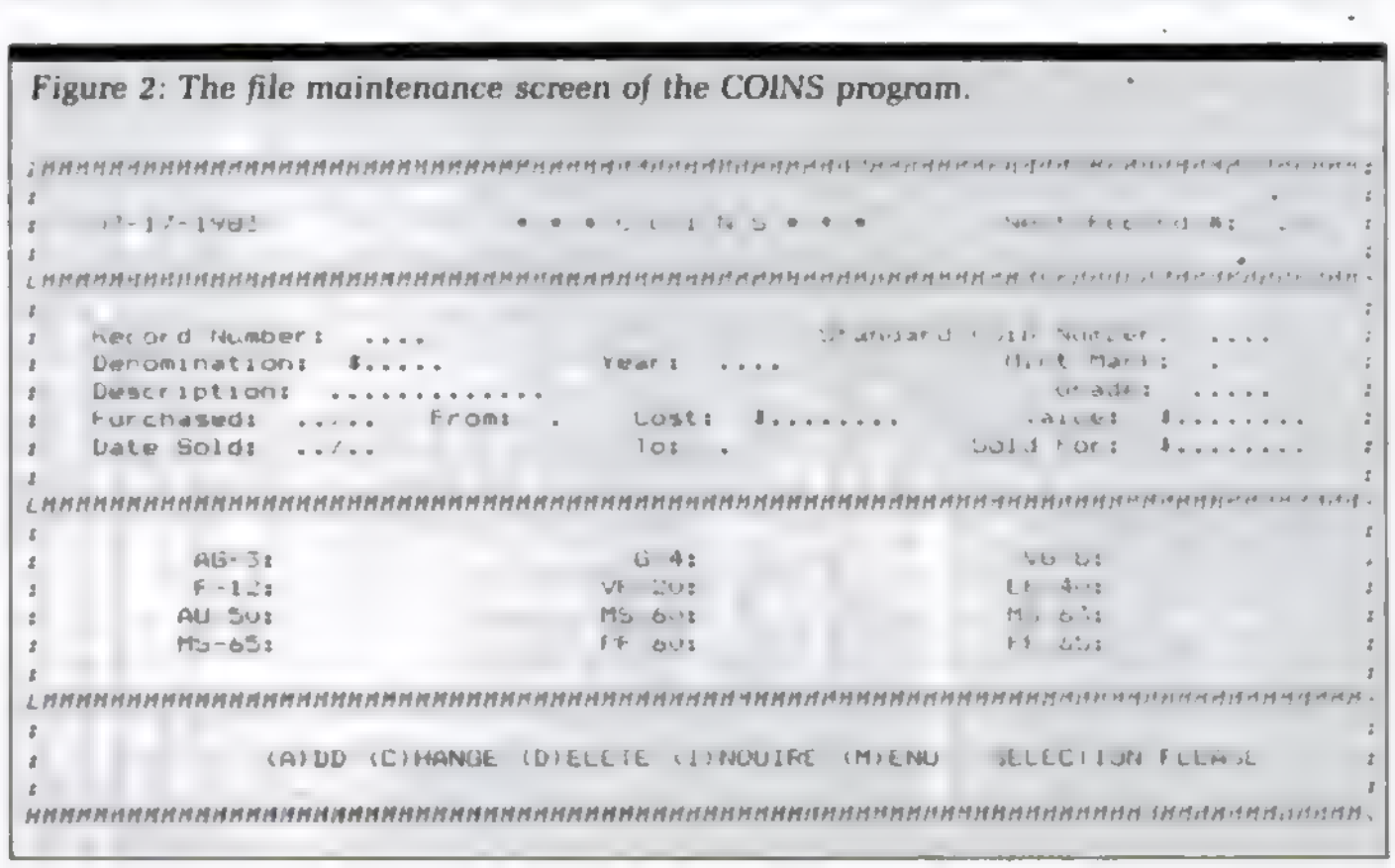


Figure 2: The file maintenance screen of the COINS program.



Coin-necting with Coin-puters

A closed-circuit telecommunications network for coin collectors, dealers, investors, advisers, and auctioneers.

Larry Brilliant, co-creator of the Complete Electronic Numismatic Trading System (CENTS), dreams of coin-necting the coin world through coin-puters. To begin to realize that dream, Brilliant and his partner, dealer-auctioneer Joseph Lepczyk, have created CoinTalk, an offshoot of CENTS, as the first closed-circuit programming telecommunications network, for collectors, dealers, investors, investment advisers, and auctioneers.

At the heart of the system is an Amdahl mainframe, housed at Wayne State University, in Detroit, Michigan. Brilliant and Lepczyk hope that the system will become an international network of IBM PCs and XTs. The PCs and XTs are linked by a telecommunications protocol, which gives subscribers what Brilliant describes as "one-button access" to the mainframe from their micros.

"It's the first attempt to computerize the market. There's enormous potential for computerizing the industry and taking advantage of the popularity of the PC," explained Brilliant. He said the concept for CENTS evolved from his past efforts with the World Health Organization to set up national disease systems to monitor smallpox and blindness in foreign countries.

CENTS is a product of MarketNet Technologies, Inc., which can be contacted at Box 860, East Lansing, MI 48823, telephone (517) 332-8641 or (800) 523-2445. Its potential market is huge: an estimated 10 million coin collectors, at least 170,000 of whom are serious enough about their hobby to subscribe to a weekly trade publication; 20,000 dealers; 300 major auction companies; and 100 to 200 investment advisory groups with 20 to 500 clients each. The system's initial capacity is 960 dealers and somewhat over 10,000 collectors, according to Brilliant.

The firm is in the process of making four basic software packages available. Bundled with the software are a modified computer conferencing system designed by Robert Parnes, and IBM or IBM-compatible hardware. Some of the software packages are now available, with the rest scheduled for release in 1984. As part of the bundling, MarketNet Technologies can make arrangements for subscribers to lease micros and printers from Huron Leasing Company, of Chicago, and is negotiating with IBM to become a value-added retailer. The firm recommends the PC for collectors with fewer than 1,000 coins and for dealers with less than 1,000 clients, and suggests the XT for those with larger collections and dealerships. All four software packages will include a built-in Hayes 1200-baud Smartmodem and a communications protocol for access to the CoinTalk network. Also available will be optional software such as spreadsheets and word processing programs for dealers and auctioneers.

CollectorPac is aimed at the individual hobbyist and includes the capability to inventory a collection, add new coins and delete those sold, prepare reports, and update values through the network. *InvestorPac*, a more sophisticated version of the collector package, is aimed at those who are into numismatics primarily to make money. *DealerPac* is more advanced: It can manage inventories, handle customer want lists, prepare camera-ready catalogs, print statements, manage client records, and even produce the necessary forms for reporting bullion transactions to the Internal Revenue Service. The final package, *AuctionPac*, will add other capabilities to the dealer package, including maintenance of bidder files, printing of bid books, and computer-matching of high bidders to lot numbers.

A subscription to CoinTalk provides a way to electronically advertise, buy, sell, or competitively bid on coins. In addition to maintaining current market values for American and foreign coins, it also makes available spot gold prices, updated every 15 minutes. Brilliant describes it as an "electronically simulated bourse." Instead of physically entering a hotel or convention center for a coin show, all registration, browsing, haggling, purchasing, and even billing is done over the network. For instance, if you're interested in buying or selling an 1880 Morgan silver dollar after signing on, you type either the category 42E or the word *dollars* and then type in the year. You'll get every 1880 Morgan available for sale from any subscriber, or wanted by any subscriber, together with the coin's catalog value and how many were minted. A prospective purchaser simply types in Buy to send the message to the offering dealer; the dealer in turn uses the system to send a computerized invoice confirming the deal.

The system could have a major impact on the way coins are bought and sold. When a customer comes to a dealer with a particular coin for sale, the coin can be advertised on CoinTalk in a matter of seconds. According to Brilliant, this means dealers will be able to buy more coins and turn them over for a quicker but smaller profit. With that kind of liquidity, "the whole market will benefit," he said.

With the CoinTalk system as a prototype, the generic concept of closed-circuit programming linking a mainframe and micros can be expanded, Brilliant says. Next on the agenda is something he calls *JobTalk* to help match employers and job hunters. —*E.F.*

tion from the market price database will be based on a single coin, unless you use 0 as the standard coin number, then enter their combined value.

As you proceed through the file maintenance screen, you can leave blank any of the fields, except the grade field, simply by hitting the enter key. You also can delete or change any default response. Function keys F1 through F5 are used to change or clear fields, abort an entry, or automatically enter the face value as the purchase price of coins you found in circulation.

The market values provided by *COINS* have been calculated based on published dealer prices, catalog and magazine price lists, and auction prices. If the grade you chose doesn't have a current market value listed, $1 will appear, and you can enter your own value after pressing C, which permits changes. Or, if you disagree with a value supplied by the database, you can change it. Press Return after the value appears; the screen will flash "Record is Added" as confirmation.

The cursor does not automatically move to the final three fields for sale date, buyer, and sale price. To fill in information in these fields, you must again press C for change.

What if your collection includes foreign or American nonstandard items? You may own, for instance, some colonial coins, an 1804 half cent, a few mint errors, three silver certificates, and a 1925 Stone Mountain 50-cent commemorative coin. If this is the case, enter 0 as the coin number, then fill in each field individually, including value. *COINS* will inventory them, but provides no value from its own database. Also, the quarterly updates will not alter the values you've entered for coins with standard number 0. So, you must obtain current estimates of the value of those items from other sources, such as hobby publications or dealers.

The Easy Part

After the data is all entered, the easy part begins: report generation. The most comprehensive listing available is Option 5, the "all entries report." This report provides a printout, arranged by denomination and year, of every coin in the file, including those that have been sold.

You may also choose to print reports by current value, by coins sold in any year, or by items purchased in any year. With Options 2, 3, and 4, you can break your report down by denomination, or include your full collection. If, for example, you're seeking buy or sell information for a year when there were no such transactions, your report will tell you, "There were no sales in 1983" or "There were no purchases in 1981." In each report, the percentage gain or loss in value is automatically calculated and printed, provided both the acquisition cost and current value fields are filled in (see Figure 3). If collecting coins is an investment for you, this information is useful in determining the appropriate selling time. The annual reports on sales are useful for determining capital gains for income tax purposes.

Figure 3. A value report generated by COINS. The program will automatically print the percentage gain or loss.

*** VALUE REPORT ***

As of 07 18 1983 Page no. 1

Rec#	Std#	Denom.	Year	M	Description	Grade	Cost	Value	Pct.%
155	1239	$0.50	1907	S	BARBER	G-4	2.00	4.85	+142.5
156	1249	$0.50	1911		BARBER	G-4	1.25	3.80	+204.0
154	1268	$0.50	1917		LIB.WALK	VG-8	0.50	7.00	+1300.0
160	1277	$0.50	1918	S	LIB.WALK	G-4	0.50	5.80	+1060.0
158	1277	$0.50	1920		LIB.WALK	G-4	0.50	5.80	+1060.0
161	1292	$0.50	1935		LIB.WALK	VG-8	0.50	7.00	+1300.0
157	1299	$0.50	1937	D	LIB.WALK	G-4	0.50	5.80	+1060.0
159	1316	$0.50	1943	S	LIB.WALK	VG-8	0.50	7.00	+1300.0
246	1328	$0.50	1948		FULL MS65+ 67	MS-65	31.50	79.00	+150.8
247	1329	$0.50	1948	D	FULL MS65+/67	MS-65	31.50	54.00	+71.4
177	1352	$0.50	1958	D	FRANKLINN	EF-40	0.50	6.25	+1150.0
		$5.50					$69.75	$186.20	+167.1

*** END OF REPORT ***

One drawback in CMS is that, as you enter information, the list of mint marks and grades does not appear on your monitor.

when there were no such transactions, your report will tell you, "There were no sales in 1983" or "There were no purchases in 1981." In each report, the percentage gain or loss in value is automatically calculated and printed, provided both the acquisition cost and current value fields are filled in (see Figure 3). If collecting coins is an investment for you, this information is useful in determining the appropriate selling time. The annual reports on sales are useful for determining capital gains for income tax purposes.

One limitation on the reports is that you can't print a report based solely on the description field. For example, you can use the description field to indicate which coins are kept in your bank vault by typing in *bank*, but you can't generate a report restricted to those coins. According to Mallon, such an idea was considered, but rejected because most collectors wouldn't need it.

The documentation states that a printer is necessary for *COINS* because, as Compu-Quote puts it, "There is too much information to portray clearly on the screen." When you generate a report, all you get is the hard copy. The screen flashes status messages such as, "now reading all records," "now sorting all records," and "now printing," but the actual report won't appear on your monitor. When the printing is complete, the main menu reappears on the screen.

A Different Approach

The second program, *Coin Management System (CMS)*, takes a different approach and requires more programming skills. It is essentially a storage and retrieval program and does not include a database of market values. Soft-Ray, its manufacturer, says about 4,000 records will fit on a double-sided, double-density diskette.

Its great strength is its flexibility. While *COINS* is oriented toward the collector or investor with a relatively standard collection, *CMS* allows you to set up your own data files by coin group, mint mark, and grade. The sample files on the *CMS* diskette include ten coin groups (which are listed in Figure 4), six mint marks, and twelve coin grades, but you can set up as many as twenty files in each of the three categories. You must erase the sample data files from your diskette and use EDLIN to create your own. The *CMS* documentation describes the recommended format for your files, but refers you to the PC-DOS manual for information on how to use EDLIN.

After your program disk is prepared by formatting, entering the appropriate DOS commands, and copying the program from the original *CMS* diskette, you enter

Figure 4. The screen in CMS for adding a new record. The ten coin groups are also listed.

```
      Add a New Record                    - Coin Groups -

1. Coin Group.............              1. Buffalo Nickel
2. Year & Mint (YYYY/MM)..              2. Jefferson Nickel
3. Grade..................              3. Franklin Halves
4. Purchase Price.........              4. Anthony Dollar
5. Date Purchased(YYMM)...              5. Eisenhower Dollar
6. Current Value..........              6. U.S. Mint Set
7. Valuation Year (YY)....              7. U.S. Proof Set
8. Comments...............              8. Commemoratives
                                        9. Bahamas Coins
                                       10. Miscellaneous
```

Figure 5. CMS can generate a high-value report, listing your collection in descending value.

```
07-20-1983              HIGH VALUE REPORT                    PAGE  1
                            U.S. Mint Set

                                        PURCHASE          VALUATION
YEAR   COMMENTS          GRADE   DATE        COST    YEAR      VALUE
----   --------          -----   ----------------    ----------------
1970   Sm. Date          MS65    70/12       8.00    83        52.00
1970   Lg. Date          MS65    70/05      11.00    83        31.50
1967                     MS65    67/11       3.00    83        13.00
1968                     MS65    68/10       3.00    83         5.35
```

RUNCMS to initialize the program and get the coin editor menu on your screen. You have six options: adding, changing records, deleting records, calling the utility, calling report menus, or exiting.

To add a record (see Figure 4), you input the coin group, mint mark, and grade based on the files you've created, as well as the year, purchase price and date, current value, and valuation year. There is also a field for comments. As with *COINS*, there's no quantity field and, thus, no easy way to track holdings of multiple coins in the same condition and denomination. However, you can use the Comments field for such a notation and can enter the combined worth of the multiple coins for current value.

Because *CMS* offers no database with market values, you've got to obtain that information elsewhere and enter it. And there is no way to automatically update those values. According to Raymond C. Whisnant, author of *CMS*, a market value database is unnecessary because the value of most coins doesn't change in the course of 1 year.

One drawback in *CMS* is that, as you enter information, the list of mint marks and grades does not appear on your monitor. If you forget that D represents a Denver mint mark or that 5 represents an Extra Fine 40 grade, the program prompts you to enter H for Help, bringing the appropriate directory to the right side of your screen. When you've completed the data entry for a coin, you're asked, "Do you want to save this transaction (Y/N)?"

More Things to Do

Records can be edited under Option 2 of the main menu by changing information in any of the fields. You will be asked if you want to save the new data before the old data is replaced. Option 3 allows you to delete a record. When you select the delete function, *CMS* will search the files based on any of the eight information fields you specify. When a matching entry is found, you'll be asked, "Is this the right one?" to prevent deletion of the wrong record. If you press N, the search will be continued.

The *CMS* utility menu allows you to search, display, change or delete records, print or pack the master file, and call the editor or report menus to the screen. You can search by any field, including Comments, an advantage if you used that field to indicate which items are in the bank or which are rolls of coins.

You can generate a variety of reports, and, unlike with *COINS*, you have a choice of printing them (parallel printer only, according to Soft-Ray) or having them appear on the monitor. To avoid lengthy lists flashing before your eyes, when a screen is full you're told to "hit any character to continue report, ESC key to exit."

With either system, it's a good idea to print out a complete inventory and store it in a safe place for insurance purposes. *CMS* can produce a number of specific reports. A "variance report" will compare purchase price with current value, giving both the variance by coin and the total positive and negative variance for all items selected. A "high-value report" will list the items in your collection in descending value, with either acquisition price or present value as the basis, depending on which you choose to generate (see Figure 5). If you're in the market to fill in the gaps in your coin collection, you can produce a "want list" by creating records on items you need, giving 0 as the purchase date or purchase price. The want list is printed in compressed type, which makes it easier to carry around to coin shops and dealers. You also can produce lists according to coin group and to time period, given in years.

Flipping a Coin?

A decision on which of the programs to buy shouldn't be made by a simple flip of a coin. The philosophies behind *COINS* and *CMS* are different, but both can help you keep track of your coin collection. You should consider the strengths and weaknesses of each system, coupled with your own skills, the size and nature of your collection, and your willingness to spend time researching market values. Given my predominantly standard collection, *COINS* is the sensible choice for me. But if your collection is more specialized, and you are willing to spend the time to periodically check on the value of individual items, *CMS* may be the program for you. For the dabbler in numismatics or for the hobbyist with small collections with little turnover, maybe neither COINS nor CMS is necessary. */PC*

THE WANT LIST is printed in compressed type, which makes it easier to carry around to coin shops and dealers.

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The first hint that the Printer Optimizer differs from most mortal printer buffers is a 16-button keypad lurking among the few controls and indicators on its front panel. Keypads are normally used for data entry, and the presence of one on the front panel implies that something inside can handle such data. In fact, the Optimizer has a built-in Z80 microprocessor. In other words, the tiny tin box of the Optimizer houses its own powerful computer. A three-character alphanumeric light-emitting diode (LED) display, a "Pause" pushbutton, and a red "Power On" LED complete the front panel controls.

The Optimizer includes two jacks on the back for Centronics-compatible parallel data input and output. An optional "Opticom" card adds extensive serial input and/or output capabilities in the form of two additional RS-232C ports. (Although the board is normally factory installed, field installation involves little more than plugging it into one connector and twisting four screws.) An on/off rocker switch and a recessed reset pushbutton complete the back.

Installing the optimizer and getting it to communicate properly with both your computer and printer requires removal of the top of the unit (two screws) and setting anywhere from one DIP switch bank (for Centronics parallel communications only) to four, for serial communications. The latter may also require rearranging several jumper wires on the Opticom card.

The instruction manual endeavors to explain all the mysteries of serial connections. However, the manufacturer's toll-free number, which, when not busy, gives you direct contact to an understanding human being, willing to talk you through the most perplexing installation process, is likely to be more helpful.

With the Opticom module installed, the Optimizer is a regular chatterbox. It will convert a parallel input to a serial out-



Printer Optimizer, showing 16-button keypad, 3-character LED display, "Power On" light, and Pause button.

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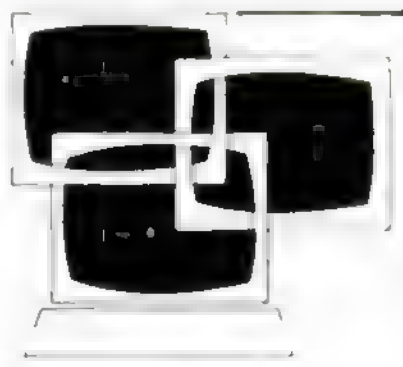
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put (and vice versa), or keep things parallel-to-parallel or serial-to-serial. The serial ports will digest and regurgitate any standard baud rate from 110 to 9600 with nearly any protocol (parity, word length, number of stop bits) and handshaking (hardware, ETX/ACK, XON/XOFF, etc.)—and input and output need not be the same. So not only can you get the Optimizer to communicate with almost anything with an RS-232 port, but even adapt a parallel output to a serial printer, or a serial output to a Centronics parallel printer.

THE MANUAL was understandable— nay, a joy to read.

Low-voltage power to operate the Optimizer is supplied by a black transformer that plugs directly into a wall outlet and is permanently wired to the Optimizer main chassis. When plugged in and turned on, the Optimizer runs through a diagnostic program that checks its health in a few seconds. If the Optimizer finds itself fit, it cheerily beeps once and displays the amount of memory available on its front panel LED display in 1024 byte increments.

I must admit I was virtually won over to the Optimizer almost before I pulled the machine out of its box and surveyed all the mechanical details. Quite by accident, I started to read the instruction manual before trying out the actual machine. I was shocked! The manual was understandable—nay, a joy to read. It made sense, was informative, and at times even delightful. It was perhaps the first manual that I did not have to put off reading until I got a Ph.D in electrical engineering.

Control Functions

The Optimizer promises three big benefits to anyone who has both computer and printer: enhanced print spooling; direct printer control; and protocol, character, and string conversion. Connecting the Optimizer essentially puts another computer between your PC and your printer. In fact, the Optimizer can be hooked up between a PC and three printers. And, like any computer, the Optimizer can be programmed to act in particular

ways upon recognizing certain codes or conditions.

The computer control functions of the Optimizer are of two types, or "modes" as they're called in the manual. The first mode, 100, sends commands directly to the printer when you press the proper combination of buttons on the front panel. Mode 200 causes the Optimizer to monitor the line to the printer and, upon recognizing a preset character or string of characters, to send other characters or commands to the printer.

Some examples may make these concepts clearer. In mode 100, you may command the printer to switch character sizes or spacings, tabs, line spacings or character fonts. It can also direct the printer to print headings or your favorite graphics.

In mode 200, you can command the Optimizer to change every letter e in your document into an asterisk. Th* imm*diat* r*sult would look som*thing lik* this. The real value of the Optimizer, however, is its ability to turn certain character combinations into control codes.

WITH THE Opticom module installed, the Optimizer is a regular chatterbox.

Control codes are those mysterious symbols that your printer manual tells you will elicit special functions—line feeds, alternate character pitches, and the like—from your printer. Usually, the most direct access to the control codes is the BASIC instruction, CHR$(n), which can be difficult to access in the middle of most word processing programs.

With the Optimizer, however, you can program the character combination][to mean "compressed print." When you type][into your document, the Optimizer deciphers the characters and sends the appropriate code to your printer.

Further, you can dispatch any string of up to 127 printable or control characters to your printer on command. Once you become familiar with the workings of the Optimizer, you can even send graphics (for example, your company logo) in the middle of a lengthy text.

Programming is simple. Press a few buttons to enter the proper mode; then punch in an equation. The LED display identifies the buttons you've pressed, and a "clear" key gives you a second (and third) chance if you make a mistake.

In mode 100, you first enter a "slot" number (which is the number you will later press to elicit the response characters), an equal sign (=), and the response characters or control codes (in decimal ASCII) that you would like the Optimizer to send to the printer.

When using mode 200, you punch in the decimal ASCII value of the characters you want the Optimizer to recognize, an equal sign, and the characters you want sent to your printer, when the recognized characters appear. Or you can program a character or string of characters to trigger the Optimizer to send the contents of a slot to the printer.

The Optimizer permits you to store commands in up to 99 mode 100 slots, at a maximum of 127 characters per slot, and mode 200 equations, at up to 127 characters per equation, to a total of 2,000 ASCII characters. This programming information is stored in a "housekeeping" memory that is kept nonvolatile (it won't disappear when the power is turned off) by a lithium battery inside the Optimizer.

The Optimizer also has three other modes. Mode 300 allows the downloading of mode 100 and 200 information through a word processing program. Thus, instead of entering the ASCII code numbers on the keypad, all you need to do is type the information into your PC. Mode 400 prints out the contents of the housekeeping memory, and Mode 500 allows you to make up to 99 copies of documents stored in the Optimizer's buffer memory.

Enhanced Spooling

The longest minutes in all of personal computing are those that stretch between the start-up of a print sequence and the conclusion, when the last form feed slides the final sheet of paper out of your printer. Too often, a printing session is an endurance test that wears you down as it supplies you with copy. While you itch to enter more data, the screen stares blankly and unyieldingly back at you.

Many word processors allow simultaneous printing and editing. But many are like my version of *WordStar*. They allow you to enter text while printing as long as

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you don't object to interminable delays (enforced by a WAIT message at the top of the screen) between keystrokes.

The print spooler or printer buffer is supposed to be the solution to this problem. In theory, the computer dumps all your precious electronic words into the buffer within seconds and frees the computer for other chores. The spooler slowly unwinds your words into the printer. At heart, the Printer Optimizer is a sophisticated print spooler. However, it starts where many other spoolers leave off. Its minimum memory capacity is 64K, the maximum of many lesser units. Additional memory boards expand the Optimizer's capacity to 256K in 64K increments.

Although hundreds of thousands of "K" may seem like more memory than you'll ever need, the first time you use a small spooler you'll quickly learn how fast memory fills up. Even though the file you want to print may contain only 30K or so of data (the typical length for a story in this magazine), the file may swell to double that size once the word processor has added formatting and other control commands for the printer. Pretty soon, you're tripping on the edges of the spooler's capacity. A small spooler will allow normal editing between the times that it's filling up the buffer, but miniscule memories cannot give many of the added features that are second nature to the Optimizer.

THE OPTIMIZER is a sophisticated print spooler that starts where others leave off.

Note, however, that even with a huge spooler, the world is not all roses. If you decide to use the Optimizer in its optional serial mode, you'll soon discover how slow its 9600 baud speed limit can be. You can't just press "Print" and keep on computing. Dumping 64K data into the spooler, ignoring disk access time, requires about a minute at 9600 baud time. Worse yet, your word processor probably won't just dump your *magnum opus* into the printer. It takes considerable time to think up its strategy for formatting each sheet and issuing proper control codes to the printer (for character spacing and the like). Even with an allegedly high-speed parallel output, dumping a long file into the printer can take several minutes.

Certainly, you'll save time with any spooler, particularly if you are cursed with a 12-character-per-second daisy-wheel printer. But, in any case, the spooling process is not instantaneous.

Print spooling, however, was not designed merely to save time. It also allows you to keep your printer and computer in separate rooms. By piling documents into the Optimizer (or nearly any spooler), you can use the printer at your leisure. The LED display on the front panel of the Opti-



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mizer indicates remaining memory available as the Optimizer consumes RAM.

When you're standing in another room, away from the keyboard of your PC, the added capabilities of the Printer Optimizer become apparent. For instance, if your word processor doesn't provide for pauses between documents, you can use Mode 200 to program the optimizer to recognize any particular combination of characters as a pause command. Just be careful that you don't choose anything that may appear as text in the middle of an actual document. Should you run into problems during the printing session, the Pause control on the Optimizer front panel will enable you to quickly shut down the printer. Likewise, by adding one or two extra characters at the end of each document, you can make the Optimizer add a form feed to put blank sheets between different documents printed in a series. Mode 500 will let you print multiple copies without reprogramming instruction after instruction into your PC. Further, you can deliver ten items to the printer in any order and program the optimizer to deliver them in a different order. You can also print text, spreadsheets, and graphs in a single output.

EVEN WITH an allegedly high-speed parallel output, dumping a long file into the printer can take several minutes.

Now that I've raved about how wonderful the Optimizer is, I'll rant about its problems and shortcomings and consider whether you actually need this little miracle in a box.

If you're thinking of purchasing a Printer Optimizer, your main consideration should be its compatibility with the software and hardware that you already have. Although the extremely flexible optional serial inputs and outputs of the Optimizer can be set to make it receive data from well nigh anything—and send data to nearly anything else—things still can go wrong. In my brief tryout of the Optimizer, I experienced some of its shortcomings.

Once upon a time, dimly aware of some of the problems inherent in *WordStar*, I invested in one of the letter-quality printers that *WordStar* claims to support fully. In other words, I bought a printer whose special features could be controlled by my software. My marginally astute choice of printer/computer combination meant that I wouldn't have to worry about sending extra control codes to my printer, at least during word processing. Consequently, for me, the Optimizer offers no new advantage in this regard.

Moreover, it turns out that *WordStar* and the Printer Optimizer are often at odds. Although it might seem like a neat

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idea to be able to change character sets, page sizes, and the like at the printer by pressing a couple buttons on the Optimizer, *WordStar* can't be outsmarted. It embeds its own commands to override the ones I program into the Optimizer. Of course, with the Optimizer you can effectively erase the commands that the software sends; but then those special features become inaccessible even when you want to elicit them through the software.

Sometimes the results of using the Optimizer are surprising. My printer picks up speed by printing bidirectionally under command from my word processing program. This means that alternate lines are sent to the printer with the characters in reverse order. The Optimizer does not recognize a string that is sent to it backwards. However, it will recognize a single character used as a command, even if it's embedded in a reverse line. If the printer is in reverse when a character command appears, the string from the Optimizer is printed backwards. Every dog turns into a *god* and *PC Magazine* transforms into *eni-zagaM CP*.

My software also sends out character-spacing commands based on what is stored in the computer memory, and cannot take into consideration what has been programmed into the Optimizer. When a single character, or character string, from the computer causes the Optimizer to send several characters to the printer, the consequences can be unpredictable. Sometimes everything works out fine; other times letters are spread across the page in seemingly random fashion.

If you think about how the Optimizer works, and you know what goes on inside your software, all these problems may be predictable, but the otherwise extraordinary manual gives the less informed among us no hint of some of the unexpected consequences that can result.

WordStar also presents problems in mode 300, downloading into the Optimizer's housekeeping memory. The Optimizer refused to react to anything that *WordStar* told it to remember. However, sending the same file using a print command instead of the word processing program worked fine.

This does not mean that there are design problems with the Optimizer. As far as I can tell, there are no major flaws. The small disasters I ran into only illustrate that the computer world is still non-standard and that you cannot always expect every piece of hardware or software to operate in harmony with every other piece. It's still a good idea to try before you buy.

THE Optimizer saves you from the frustration of having a single-minded computer that will do only one thing at a time.

The only other shortcoming of the Optimizer I encountered is the location of the Reset button on its back panel. Certainly, a control that vaporizes everything in the unit's memory needs to be kept out of harm's way, but normal operation of the Optimizer often requires pushing this button. To prevent surprises, it must be pressed before entering Mode 500, for instance. Then it's grip and grope, feel and fumble time. Surely this control could be relocated to a more convenient position—to the front panel, perhaps. For safety, the Reset could require pressing two buttons simultaneously.

Nearly any accessory you can buy for your IBM PC claims to save you time and money. The Optimizer saves you something even more valuable; it saves you from frustration, the frustration of having a single-minded computer that will do only one thing at a time, the frustration of software that believes words and graphics mix about as well as oil and water, and the frustration of software and a printer that require a séance to speak to one another. Although the Printer Optimizer's primary benefit is convenience, it can also add new capabilities to your PC system and help you make better use of those you already have. */PC*

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HARDWARE/WINN L. ROSCH

The PipeLine printing buffer allows you to do more than just compute and print at the same time. But, using it may amount to nothing more than replacing expensive software with expensive hardware.

Printing Through The PipeLine

Interactive Structures PipeLine
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The PipeLine random access printing buffer is cased in a bright yellow metal box with the control panel on the top.

Barely a year ago, a printer buffer was a marvelous new invention that promised to nearly double the use of your computer by allowing you to print files and play at the keyboard at the same time. You were lucky to be able to get your greedy hands on one.

Today, a mere buffer is not enough to satisfy innovation-hungry consumers. To stand out from the crowd of all-too-similar products, a printer buffer now must provide such capabilities as reorganizing data, sorting through your confusion, dotting all your *i*'s, or polishing your bowling ball.

The PipeLine is a new buffer that may not offer miracles, but does deliver a little extra (or, in the manufacturer's view, a lot extra.) With it, you can reorganize data in chunks in order to mix blocks of graphics with text and put a chart in the middle of your monthly report. You can relocate pages and paragraphs or insert names into blanks in your prefabricated forms like a mail merge program would do. The PipeLine also allows you to print multiple copies of one file without the bother of sending it to your printer each time. Neither do you have the interminable wait to use the computer again while each copy is printing. Further, files that you use most

often—a short graphics routine for making personalized stationery with your dot-matrix printer, for instance—can be kept in the PipeLine and shot out to your printer with just a couple of keystrokes. You can even store and send commands to your printer that your word processor doesn't know—commands, say, for different character widths, alternate typefaces, or even changing ribbon colors.

IF WHAT COMES out looks like what went in, you can assume everything is working well.

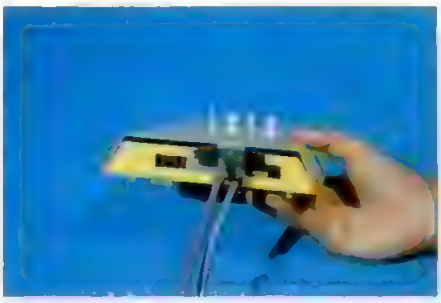
All of this magic is contained in a bright yellow box, all metal on the outside, and only slightly larger than book (Richard Bach rather than Herman Wouk) size. "Truncated trapezoidal prism" would be a scientifically correct physical description of the PipeLine; in simpler terms, that means its two long sides slope inward. Two short cables are permanently attached to this oddly shaped tin box, and an external power transformer (also known as a transistor radio AC adapter) plugs into the back of the PipeLine through a slender cord to power it.

The entire control panel of the PipeLine consists of two pushbuttons (Interrupt and Erase), two toggle switches (Bypass/Normal and FIFO/RAP), and an LED that adorns the top of the front edge of the box. These switches control the three modes of the PipeLine's operation, which combined are what sets it apart from other buffers.

Levering the first toggle switch to Bypass mode renders the PipeLine into a very expensive piece of wire, which routes the output of your PC directly to your printer—untouched and unscathed.

When you flick the same switch to Normal and the other toggle switch to FIFO (First In/First Out) and press the Interrupt button so that PipeLine knows you want to make a change, the yellow box becomes a plain vanilla printer buffer. It swallows up data as fast as your computer can send it and feeds your printer 1 byte at a time, regardless of the rate at which your printer can consume it. Buffer capacity can be from 8 to 128 RAM, depending on the number of memory chips that are installed. The PipeLine's capacity in printed pages—a measurement—varies according to the width of your margins and the number of spaces (if any) between lines, but a rough estimate would range from several pages (at 8K RAM) to a hundred or more (at 128K RAM). Because it uses a "data compression" storage technique, a given number of memory bytes can hold more pages in the actual hardware than in your PC's disk or hard memory storage. Extra memory for buffering a greater number of pages can be added at any time. (The instruction manual even tells how to do it yourself and what integrated circuit memory chips to buy, if you don't want to order them from Interactive Structures—a thoughtful touch.)

The miracle of the PipeLine lies in its third mode, Random Access Printing (or RAP), which requires throwing the toggle switch to the position appropriately marked RAP. Interactive Structures describes the RAP function in terms of "data buckets." Computer-oriented people may be more familiar with the term "partitioned memory." Either way, this means that the whole of the PipeLine's memory can be divided into smaller blocks (buckets or partitions—segments, chunks, blocks—pick your favorite term), which can be filled or sent to your printer independently of one another, and in any order you might want.



PipeLine's cable is unprofessionally finished; about a half-inch of the outer insulation is stripped off.

In RAP mode, 12 elementary software commands can be stacked or strung together to unleash a nearly limitless number of functions. All of the RAP functions are controlled by sending special combinations of characters from your PC as if they were going directly to your printer. The PipeLine eavesdrops on the printer line, and when it hears a command directed to it, it intercepts the special control characters and provides the desired function.

Installing the PipeLine in your computer system is a simple procedure. Other than the power cord, there are only two cables. One connects to the end of the wire that would normally plug into your printer (a standard Centronics parallel connector—the PipeLine only comes in a parallel interface configuration); the other cable plugs directly into your printer. You won't go wrong installing the PipeLine if you pretend that it is just an ordinary printer extension cable.

The Plain Vanilla Buffer

A buffer can be described as a safe zone that insulates two warring parties. In computing, these warring parties are often a printer and its host computer, and the battle is usually one of words. The computer simply wants to dump out all of its all-electronic *bon mots* at a speed faster than the mechanical workings of the printer can handle. The result is that the computer's lightning speed becomes mired in the mechanical mud of the printer's painfully slow speed. Usually the computer doesn't mind the wait, but the computer owner, who invested $5,000 in a system to save time and increase efficiency, does mind. He resents waiting for what was supposed to be a time-saving device.

A printing buffer solves this problem by sucking up data like a sponge, as fast as the computer can send it, and then slowly squeezing the data out at a speed the printer can handle.

Electronically, a printing buffer need not be complex. An elementary buffer is comprised of a block of memory, read/write random access memory chips (RAM), and whatever additional circuitry that may be required to translate "outside world" computer-to-printer communication signals into its own inner-world data storage signals. PipeLine calls its electronically simple buffer (its function) First In/First Out (remember the FIFO switch?) In the trek through the buffer, the order of the data bits in a file to be printed is not changed. The first bit in must be the first one out.

Evaluating a primitive printer buffer (or Pipeline's equivalent function, FIFO)

is easy. If what comes out looks like what went in, you can assume everything is working well. The PipeLine passes this simple test. Conclusion: Used as a mere buffer, the PipeLine will save you time. You can, in fact, print and compute simultaneously.

Nonetheless, your expectations must be reasonable. When using a printing buffer for the first time, you might be surprised that it does not instantly drain all the data out of the computer and allow you to go on to your next task without a pause. Alas, no data transfer can be instantaneous. Even with PipeLine's quick parallel interface, you'll still have to wait those few seconds or minutes for it to suck your PC's memory dry. A one-page letter can be dispensed with in barely the wink of an eye, especially if you have arthritic eyelids. Fifty or one hundred-page reports may allow you enough time to grab a cup of coffee. In either case, the wait is short and not too annoying. The slower your printer was without the buffer, the greater the time savings will seem with a buffer.

To get the most out of your printing buffer, you must use continuous form paper (either roll or fanfold tractor fed), because, unless you have four hands, you won't be able to compute and load the printer at the same time. And even if your word processor is smart enough to pause and allow you to change sheets, you'll be able to buffer only one page at a time, which is a waste of the buffer's abilities. Buy a tractor feed for your printer first; then consider buying a printer buffer.

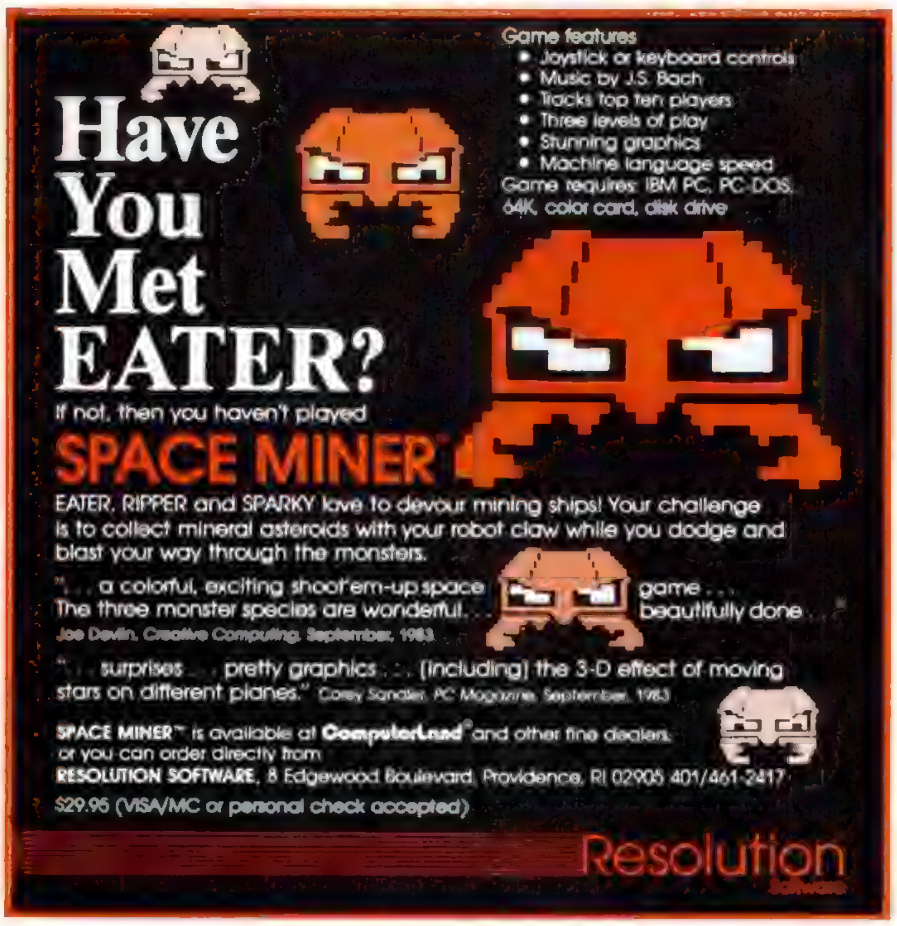
ALAS, NO DATA transfer can be instantaneous.

Breaking It Up

What distinguishes PipeLine from ordinary printing buffers is its ability to partition its memory. Normally, the memory of a buffer has no particular organization. The bits of data are just squeezed through the buffer without obstruction. The RAP function, however, divides up the length of the PipeLine into short segments (up to 63 of them). Nothing actually is changed in the memory hardware itself. Rather, the beginning and end of each segment, or partition, is marked by the insertion of extra control characters. A microprocessor—essentially a tiny computer inside a single integrated circuit chip—keeps track of each memory partition and allocates the PipeLine's RAM among the different partitions as needed. But the microprocessor doesn't just chop things up on its own. Your PC instructs it when to begin and end each partition and what to do with each one—either keep it in memory or send it to the printer.

Normally, the PipeLine remembers all of the data sent to it, no matter how many partitions it has been instructed to create. When it receives an instruction to print the contents of a given partition, the PipeLine's microprocessor examines the whole of memory, looking for the control characters that mark the beginning of the desired partition. It then starts sending all of the data it encounters in that partition to the printer until it finds the control character marking the end. Then it stops sending data, sits back, relaxes, and waits for the next instruction.

At first, the buffer's ability to make partitions and send them in any order might not seem especially useful to you. Why would you want to alter the order of signals coming from your PC to our printer? Changing the order of letters within words would be rather *cnfusngoi*; you'd end up with gibberish. Other changes of order, such as moving and rearranging chunks of data that already have a logical on-paper order, are handy, however. For instance, you fill a partition with the data for a *VisiTrend/Plot* chart, and then send PipeLine a command to print that partition in the middle of a sales/promotion letter—an effective way to mix text and graphics. Because commands to the PipeLine consist of combinations of printable characters unlikely to occur in normal text, they can be stored along with the characters of a normal word processor file. For instance, a PipeLine command embedded within a letter can contain a complete graphics routine—or a boilerplate para-



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graph—or an escape sequence that changes ribbon colors on your expensive but not software-supported multicolor printer. Breaking up the buffer's memory doesn't sound like a bad idea, does it?

IN THE RAP MODE, the PipeLine is nothing like a simple printer buffer.

A New Language

Learning to operate the RAP functions introduces you to a whole new language. You may have noticed a mention of control characters, which are new codes you'll have to learn to operate the RAP functions. Fortunately, there are only a few of them, and they are logically assigned. Every command begins with an introductory character, the at symbol (@), which tells the PipeLine to start listening because a command follows. Any of several additional characters may follow.

Every partition of memory must be labeled so that the PipeLine's microprocessor can identify it. The PipeLine uses simple one-character names drawn from the complete alphabet, both upper and lowercase, together with the special symbols "[," "\," "]," "^," "_," "`," "{," "|," "}," "~," and a blank space (" "), to total 63 possible partitions. The numbers zero through nine are reserved for commands for manipulating the partitions. A partition is labeled by sending the PipeLine the at symbol (@) followed by the appropriate label. Every character of text following the label is then stored in a given partition. As PipeLine reads data to send to your printer from a partition and it encounters the label of another partition, it stops sending data, hunts for the designated partition, and sends the second partition's data to the printer. When finished with the second partition, it resumes sending from where it left off in the first partition. In other words, one partition can call up another—one partition may be nested inside another. However, one nest is the limit—no wheels within wheels within wheels here. If you try to get the PipeLine to call a partition from within a partition called by another partition, it loses its place. You can, however, have one partition call up a string of other partitions in sequence.

Obviously, once you start a partition you must end it before starting another, otherwise the PipeLine might think the second partition designator is calling another partition. To end a partition so you can start another, you must send the command @8.

To send the contents of any partition to your printer, you command the printer @6, followed by the name of the partition. To print the same partition multiple times, send the command @5, followed by the number of copies (up to 254), followed by the partition name. If you tell the PipeLine to make 255 (or more) copies, it will print an unlimited number of them, continuously—until you press the Interrupt button.

If you're in a rush to send, say, a short letter to your printer, and the PipeLine is busy sending 75 copies of your latest book, you can shift the buffer into the Bypass mode by sending the command @3. Print your letter, then press the Interrupt button, and PipeLine will resume its RAP operation at exactly the point where it left off.

Similarly, if you insert the command @2 in the middle of a partition, the PipeLine will switch into the bypass mode. The data will pass through the PipeLine to your printer, but will remain untouched. Your printer will pause, and you can type in a name or a paragraph. Send another @2 command from your keyboard, and the PipeLine toggles back to sending data from the partition.

If you store graphics in a partition, a potential problem may arise. The graphic instructions to your printer will contain the symbol @, which the PipeLine will interpret as a command. To prevent such misinterpretations, send the command @4, which causes the PipeLine to ignore all commands until the Interrupt button is pressed. Similarly, the command @7, embedded in the text within a partition,

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causes the PipeLine to ignore everything in the partition until the next @7 command is encountered. By surrounding notes for text with @7s, you can prevent them from being printed.

Command errors can be avoided by changing the introductory character. An @@ command tells the PipeLine to change the command lead-in character to match the character that immediately follows the @@ command.

In the RAP mode, the PipeLine is nothing like a simple printer buffer. It doesn't send data to your printer while you fill it with information from your computer. After all, it expects to have its memory partitioned, and to be told in what order you want them printed. Consequently, the PipeLine operates in two modes, Fill-up and Print. To enter Print mode, send the command @9, which tells the PipeLine that you're finished sending it data. To switch back to the Fill-up mode, you send the @1 command. And, when you don't know what else to do, send an @0 command, which will cause the PipeLine to erase all its memory and enter whatever mode at which its control panel switch is set. (Pressing the Interrupt and Erase buttons simultaneously will have the same effect.)

YOUR PRINTER, generally obedient and dumb, may blindly finish the last 12 lines on its rubber platen.

An evaluation of the PipeLine is straightforward, at first. Just answer the simple question: Does it do what it claims? Plug it in, try it out; the answer is yes. The PipeLine does everything it claims to do, in exactly the manner promised. But that's hardly the whole story.

The question is not whether it works, but how well it works for you. The special features of the PipeLine set it apart from the common order of printer buffers, and these features are probably a reason to choose PipeLine over the other products.

If you're more into printing than programming, the PipeLine may be more than you want to deal with. Using it effectively entails learning the instruction set. The set PipeLine uses is small enough that proper commands will probably become second nature to you within just a few hours. Nevertheless, using the commands can be unwieldy, and it's easy to make an error. For instance, imagine sending the string @R@6B@6G@6M@6S@6E@8@9 (an example given in the PipeLine manual, which creates a partition that prints five other partitions in a particular order).

Furthermore, since the PipeLine manipulates data *after* it leaves your computer, visualizing what the results will look like is left to the imagination. If you choose to pile partitions on top of one another, you won't know what you've got-

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ten yourself into until print hits the paper. It might take two or three tries before you get a printout you're satisfied with—a waste of both time and paper.

Mixing graphics and text in one document is one of the PipeLine's greatest attractions, but if you're not careful the result may be like mixing oil and water. For instance, should your word processor perform automatic page formatting, dropping a block of graphics in the middle of a previously formatted page probably will have undesirable consequences. Typically, your word processor plans to fill a page 66 lines long, spacing out the top and bottom margins with blank lines. The PipeLine has no page formatting capability; it just mixes things together with the kind of care a McDonald's cook, not Julia Child, would take. You splice 12 lines of graphics in the middle of a 66-line page, you end up with a 78-line page, on 66-line paper. Your printer, generally obedient and dumb, may blindly finish the last 12 lines on its rubber platen.

IT'S HARD TO ignore the packaging—its bright yellow finish screams for attention.

There are two solutions. You can tell your word processor the text page will be only 54 lines long (if you've mastered your word processor), or you can add @7 commands around a block of text equal in size to the graphic insertion you want to make, which will make the text invisible to PipeLine. Either method works, but first you must calculate the proper sizes so that everything fits. And if you change the insertion, you've got to go back and change everything else.

You probably can achieve the same effect without the PipeLine by leaving a blank hole in your text on a page and running the paper through your printer twice—once for text and once for graphics. It works and is probably cheaper than buying PipeLine, especially if you need to do it only once in a while.

Using the PipeLine to merge names into documents is like hiring an earth mover to weed the garden—don't expect a particularly elegant job. PipeLine, although quite intelligent, cannot readjust the length of lines. If the names on a list include Don Ho and Theophilous Gonowandapothanondalous, you can expect some awfully ragged margins. Your printer may blithely peck its way off the page. Don't even think about justification (in any sense of the word). Nor will the PipeLine handle a lengthy list. The small number of partition labels limits it to fewer than 63 different insertions.

Nonetheless, you can work around these shortcomings. By making adjustments to your text formatting, you can use the PipeLine to make every sheet of paper into custom stationery. Store the graphics commands or escape sequences for your printer in the PipeLine and elicit them with a simple instruction for each letter, even coming from a belligerent word processor.

Form Versus Function

No matter how you view the PipeLine, it's hard to ignore the packaging—its bright yellow finish screams for attention. That's strike one against the design. The IBM PC, with its businesslike appearance, is designed to fit into the most conservative office, and the glaring PipeLine looks a bit out of place. You would hope the flat, compact package could be stuffed away out of sight, but the PipeLine apparently was not designed for hiding—its controls are on top.

Strike two against the design is its external power transformer. There's nothing wrong with the outboard transformer itself, unless you have minor prejudices, as I have. The big, black thing is inconvenient to plug into a confined space (say, for example, behind a loaded filing cabinet). Once it's quietly absorbing electrical nourishment, its bulk takes over the outlet, making it difficult to plug in anything else. And it's always there; so it's only a few watts, it's just as incessant and as costly as a dripping faucet.

The external transformer brings even worse problems with it. Although it secures itself tightly to the outlet, it's attached to the PipeLine itself by a standard battery adapter plug and jack. This means that it's easily unplugged, especially accidentally. Even a neophyte in computing should know what happens when a block of RAM memory loses its electric

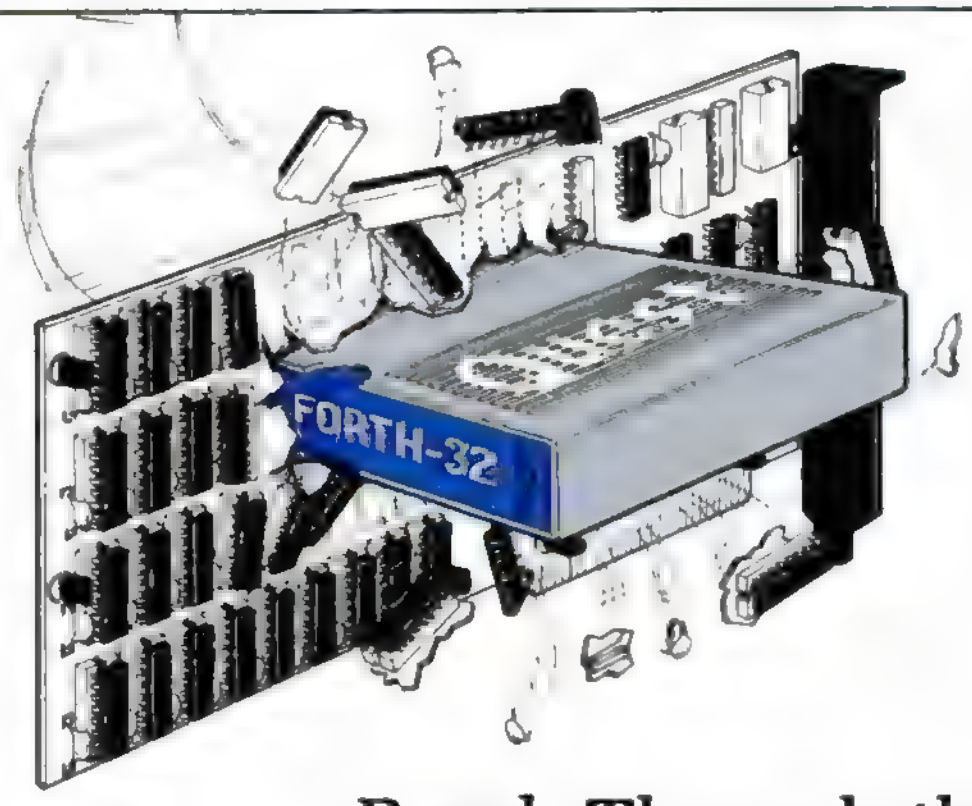
supply—total amnesia. All the data stuffed into the PipeLine vanishes without a trace. Sure, you probably will still have all of your vital information safely stored in your PC, but you'll have to spend time sending it back out to the printer, and more time duplicating the first part that was already printed. And that wastes the valuable computer time the PipeLine was supposed to be saving.

Strike three against the design of the PipeLine is the care taken in workmanship and finish. Although the internal electronics are reasonably well designed and installed on professional quality circuit board, the outside-final touches are rough and have a home- or garage-made look. My big beef, though, is the mounting of the two cables that run to the outside world—to your PC and printer. Although the instruction book shows flat "ribbon" cables, the unit I tested was equipped with fat, round shielded cable. That's good, because shielding helps to prevent radio interference; but on the PipeLine, the attachment of the cable leaves much to be desired. The connection does not seem terribly strong, perhaps only one accidental yank from disaster. And the cable itself is unprofessionally finished: At least a half-inch of the outer insulation is stripped off, leaving the frayed, woven copper shielding bare to the world, waiting to pierce microholes in careless fingers.

None of these deficiencies will cause problems in normal operation provided you are careful. Take note, however, that nearly everything the PipeLine does can be done in another way. Once you have a foundational knowledge of DOS, you can set up and manipulate files on disk just as you would partitions in the PipeLine. Software is readily available to turn a block of your PC's RAM into a print spooler, which is merely an internal printer buffer. Certainly either method works—your choice depends on which is easier for you to operate. The commands of the PipeLine are easy to learn, but it may be more satisfying to have a good grasp of your computer's software.

The PipeLine manual says, "Random Access Printing eliminates the need for costly software or special packages to combine output from different sources." This statement is indeed true. However, in buying the PipeLine you merely will be substituting costly hardware for the costly software. */PC*

THE COMMANDS of the PipeLine are easy to learn, but it may be more satisfying to have a good grasp of your computer's software.



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CIRCLE 378 ON READER SERVICE CARD

HARDWARE/COREY SANDLER

Last month PC Magazine presented a review of 13 dot-matrix printers and pondered whether these new machines had redefined the term "letter-quality." This month PC discovers more answers . . .

A Plenitude of PRINTERS: Part Two





In his article "A Plenitude of Printers" (PC, Volume 2 Number 5), author Winn Rosch points out that although 13 printers were put through their paces it was not possible to test every feature belonging to each printer. To provide you with more information for a better comparison PC has produced two bar graphs that depict the tested high speed performance in characters per second (cps) versus the manufacturer's claimed high speed, and the tested noise level for each printer. For purposes of comparison, we have also reproduced print samples from each printer. The manufacturers' addresses and list prices (where available) are listed separately.

Each of the 13 machines was tested in the PC office. In-depth reviews of some of these printers will appear in future issues of PC. Suffice to say when shopping for a printer, you should keep this checklist in mind: What you want to produce on your printer: Charts and graphs or business letters and reports? Where will the printer be located; in a business office or in your office at home? Will the additional noise drive your fellow workers to distraction, or will you be the only one to hear your printer as it generates copies of your latest literary masterpiece? And how much do you want to spend? Keep in mind when you go shopping that printers can range from under $500 to over $5,000. As always when shopping for computer hardware, price is not necessarily the best measure of quality. Know your capability requirements before making a purchase decision. /PC

WHEN shopping for hardware, price is not necessarily the best measure of quality.

Product and Price Information

Mannesmann Tally MT-160
Mannesmann Tally
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Kent, WA 98032
(206) 251-5500
List Price: $798

NEC PC-8023A-C
NEC Information Systems, Inc.
5 Militia Dr.
Lexington, MA 02173
(617) 862-3120
List Price: $499

Okidata 2410
Okidata Corp.
111 Gaitheri Dr.
Mt. Laurel, NJ 08054
(609) 235-2600
List Price: $2,995 (parallel); $3,145 (serial)

Printek 920
Printek
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Benton Harbor, MI 49022
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Telex: 810-270-3112
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Texas Instruments 810-LQ
Texas Instruments, Inc.
Data Systems Group
P.O. Box 1444, M/S 7793
Houston, TX 77011
(713) 490-2000
List Price: $2,495

Toshiba P-1350
Toshiba America, Inc.
Information Systems Division
2441 Michelle Dr.
Tustin, CA 92680
(714) 730-5000
List Price: $2,195

Anadex WP-6000
Anadex, Inc.
20732 Lassen St.
Chatsworth, CA 91311
(213) 998-8010
TWX: 910-494-1761
List Price: $2,700

Dataproducts M-100
Dataproducts
6200 Canoga Ave.
Woodland Hills, CA 91365
(213) 887-8489
Telex: 67-4473
List Price: $3,000

Datasouth 220
Datasouth Computer Corp.
P.O. Box 240 947
Charlotte, NC 28224
(800) 438-5050
(704) 523-8500
List Price: $1,995

DEC LA-100-PC
Digital Equipment Corp.
Terminals Product Group
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Marlboro, MA 01752
(800 -Digital ext. 700)
List Price: $1,595 (receive); $2,195 (transmit)

Envision 430
Envision
631 River Oaks Pkwy.
San Jose, CA 95134
(408) 946-9755
List Price: $5,450

Florida Data OSP-130
Florida Data Corp.
600 D. John Rodes Blvd.
Melbourne, FL 32935
(305) 259-4700
List Price: $4,100 manufacturer's suggested retail price.

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Telex: 692422
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About The Charts

The two comparative bar charts in *PC Magazine*'s analysis of the newest generation of dot matrix printers were prepared on a Hewlett-Packard HP-7470A two-pen flatbed plotter.

The charts entitled "Printer Noise Level" and "Price Versus Top Speed" were drawn under the instruction of the new *Peachtree Business Graphics System* package for the IBM PC. That system includes Line, Bar, Area, Double-sided Bars, Pie, Word, Critical Ratios, Histograms, and Scatter Charts.

Remember that price—and speed—are not everything. There are super-fast printers whose quality may be unacceptable to you. There are slow, inexpensive machines that may otherwise fit your needs exactly. Be sure to examine the print samples and full technical and qualitative details that appeared in *PC*, Volume 2 Number 4.

The chart entitled "Printer Top Speed" was prepared with *Graphwriter* software for the IBM PC. The "basic" set of charts in that package includes Vertical Bars, Horizontal Bars, Segmented and Clustered Bars, Pies, Line, Scatter, Bar/Line Combination, and Word Charts. An "extension set" of charts, due on the market soon, will include such specialized offerings as Gantt, Organization, Bubble, Table, Pie/Bar Combination, Surface, Double Stacked Bars, Grouped, and Range charts.

The difference between the manufacturer's claimed top speed and the *PC Magazine* test results is often akin to the difference between an automobile company's mileage claim and that discovered by the bill-paying customer. A manufacturer may run its test using a particularly easy set of characters and with a program optimized to the machine. *PC*'s test (the BASIC listing was published in Volume 2 Number 4) is designed to put a printer through a difficult, real-life run.

Charts prepared by Corey Sandler

Peachtree Business Graphics System
Peachtree Software, Inc.
3445 Peachtree Road, N.E.
Atlanta, Georgia 30326

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Graphwriter
Graphic Communications, Inc.
200 Fifth Ave.
Waltham, Mass. 02254

CIRCLE 537 ON READER SERVICE CARD

H-P 7470A Plotter
Hewlett-Packard
1501 Page Mill Road
Palo Alto, Calif. 94304

CIRCLE 536 ON READER SERVICE CARD

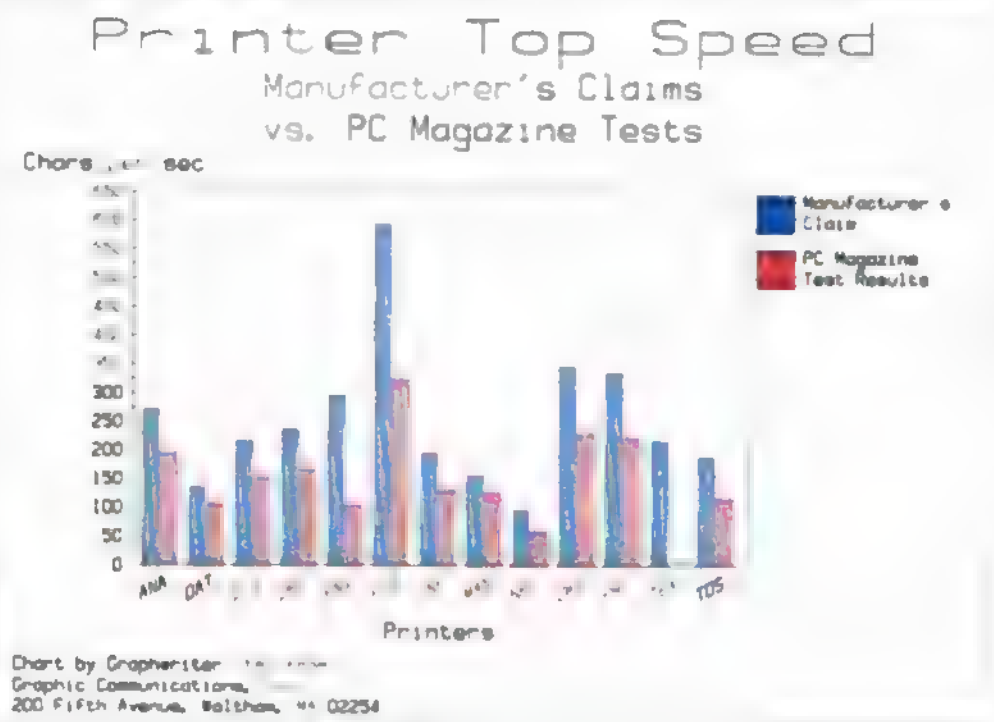


Chart 1: Test results for Texas Instruments printer were not available.

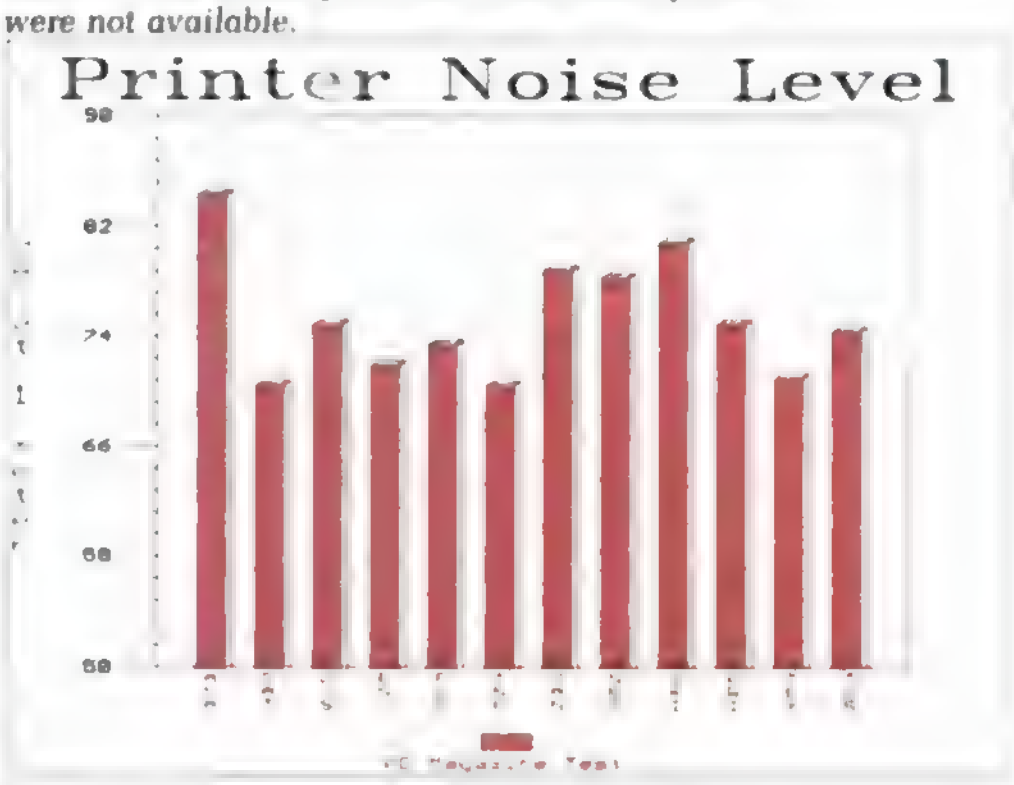


Chart 2: The dB sound level reading for DEC printer was not tested by PC.

Key to Charts

MAN	Mannesmann Tally MT-160
NEC	NEC PC-8023A-C
OKI	Okidata 2410
PRI	Printek 920
TEX	Texas Instruments 810-LQ
TOS	Toshiba P-1350
ANA	Anadex WP-6000
DAT	Dataproducts M-100
D-S	Datasouth 220
DEC	DEC LA-100-PC
ENV	Envision 430
FLO	Florida Data OSP-130
INF	Infoscribe 1100

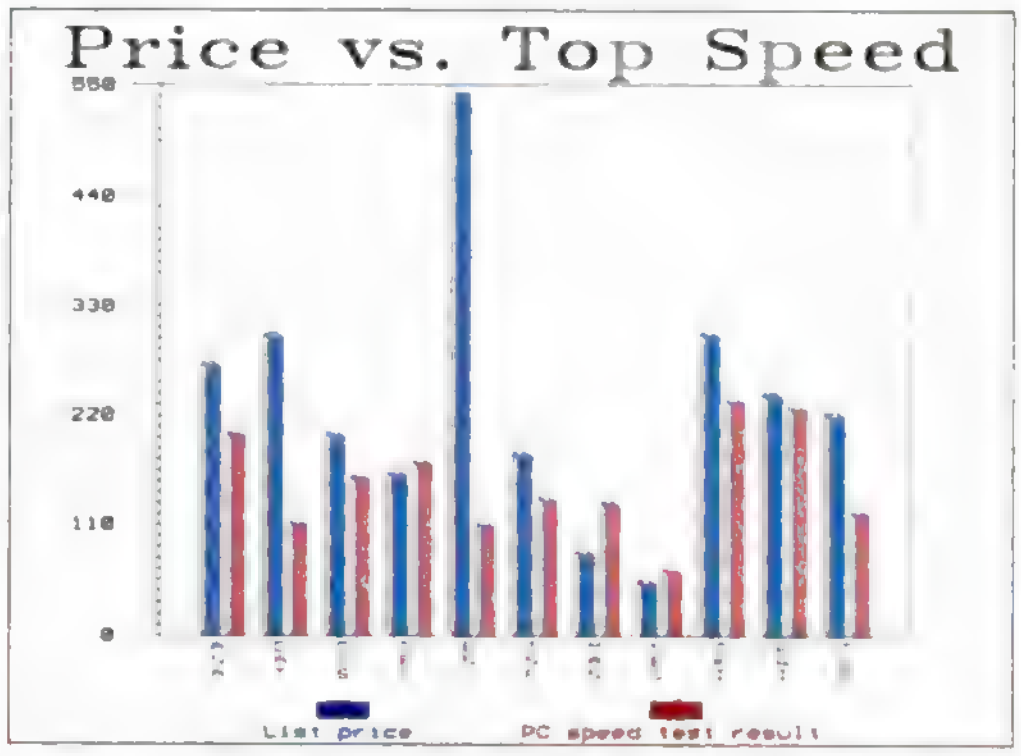


Chart 3: Print speed is as indicated on the axis. Prices are times 10.

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Though the microworld has changed in the wake of the IBM PC's progress, computers based on the older S-100 bus are useful—and compatible—vehicles.

MS-DOS Boards The S-100 Bus

Even if all the software you like is for the IBM PC, don't throw away your S-100 system. You can add MS-DOS to existing microcomputers that use the older plug-in design. Several firms are even about to market new S-100 MS-DOS machines.

Manufacturers cite these reasons for sticking with the S-100 bus for their MS-DOS systems: faster processing, greater flexibility, and the economic savings from extending the life of current systems.

Of course, MS-DOS is not PC-DOS, and not every program that runs on the PC will run on the MS-DOS versions used on these S-100 machines. The important part of PC-DOS compatibility, most software experts agree, is not really the disk operating system itself—instead, the key is in the direct use of the IBM's ROM calls and display RAM by programs based on PC-DOS. Although a program should, theoretically, make all its requests for hardware services from the DOS, Microsoft never defined any graphics within MS-DOS, and IBM has encouraged developers to bypass the DOS and instead to make direct calls to hardware.

Even so, many developers of major software packages are adding "vanilla" MS-DOS versions to their lists of supported formats. Major distributors expect this trend to support MS-DOS will continue.

According to Microsoft's Chris Lawson, there are four direct sources of MS-DOS for S-100 machines. You can either get software from Lifeboat Associates, or hardware and software combinations from Seattle Computer Products, Zenith Data Systems, and Lomas Data Products Company. A fifth firm, Computer House, buys MS-DOS from Lomas for resale.

The Lifeboat Line

If you have the right hardware, the Lifeboat route can be the quickest and the least expensive, but it is a bit unconventional. Lifeboat sells MS-DOS for a standard 16-bit S-100 system from CompuPro, but there's no formal contact between the two companies.

CompuPro officially endorses only CP/M-86 for 16-bit systems; spokesperson Jeff Swartz says that CompuPro's policy is to concentrate its energies on the Digital Research operating system. Lifeboat decided to support the CompuPro system because of requests from software developers, and because CompuPro's hardware has a reputation as a reliable, well-supported system.

Lifeboat configures its SB-86 version of MS-DOS for a standard CompuPro system designed to run both CP/M-80 and CP/M-86. The system uses a dual processor CPU card, which carries Intel 8085 and 8088 microprocessor chips.

Although the preliminary Lifeboat implementation was targeted for software developers and sold under a no-support, no documentation policy, Lifeboat President Edward Currie says that his firm now includes the CompuPro version of MS-DOS in its regular SB-86 product line, with full support and updates. The supported version is priced at $200 and comes with the Emulator-86 program that allows CP/M-86 programs to run under MS-DOS.

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Lifeboat's preliminary, no-frills version was available only as MS-DOS 1.25 on 8-inch disks. But if you had a CompuPro system of the correct vintage, all you had to do was slip the disk in and reboot. The package also works on current CompuPro systems, but the newer boards need the "GO-86" ROM, which is no longer used for the standard CP/M-86 system, but is still available from CompuPro and its dealers.

The first version to be fully supported by Lifeboat was an MS-DOS 1.25 that would only read 8-inch disks. Later this fall, the full 2.0 version of MS-DOS with support for both 5¼-inch and 8-inch disks, should become available. CompuPro has added 5¼-inch capability on the "L" revision of its Disk 1 controller card, so that should ease the task of using MS-DOS.

Stopping by The Computer House

If you want a supported CompuPro version of MS-DOS and the ability to read IBM-format 5¼-inch disks right now, another route is to buy the MSPRO package from Computer House. This firm is a CompuPro System Support Center that assembles various systems using mostly CompuPro equipment. By adding a disk controller from Lomas Data Products, Microhouse gives its package both the ability to read IBM PC disks and to qualify for the license to use MS-DOS.

MANY developers of major software packages are adding "vanilla" MS-DOS versions to their lists of supported formats.

With the MSPRO diskette alone, a standard CompuPro system can run MS-DOS and be used for software development or general computing use. With the Lomas controller installed as well, the system can also read and write IBM PC-compatible files on the 5¼-inch drives, and now run programs and store data on either 5¼- or 8-inch drives.

The full MSPRO package includes the GO-86 PROM, the Lomas controller set up for 5¼-inch disks, MS-DOS, documentation on the system, and the standard Microsoft MS-DOS manuals. Computer House president Leon Kunstenaar noted that his firm provides full telephone support and is committed to bringing up successive releases of MS-DOS.

Various combinations of software, controller boards, and disk drives are available, with prices ranging from under $400 to just over $1,000.

North to Seattle

Seattle Computer not only had an Intel 8086 on the S-100 bus long before there was an IBM PC, this company even wrote the ancestor to what is now MS-DOS. The Seattle 8086 CPU was the first widely dis-

MS-DOS: Born on the S-100 Bus

The operating system most widely used on the IBM PC spent its early days in Seattle.

The MS-DOS operating system was actually born on the S-100 Bus. In 1979, when Seattle Computer Products first turned its hand from packing memory boards to putting the new Intel 8086 microprocessor on a CPU card, there was no readily available operating system. Digital Research was slowly developing CP/M-86, but rather than wait out the delays, SCP decided to go ahead on their own.

The first versions of QDOS, the "Quick and Dirty Operating System" were released in 1980, and served mainly to support Seattle's 8086 board. But Seattle made a marketing agreement with its neighbor, Microsoft, which later grew into a sale of exclusive rights. In the few short generations from 1.14 to 1.25, the humble origins of MS-DOS have passed almost completely from the microcomputing community's consciousness. —S.R.

tributed personal computer card to have a chip in the Intel 8086/8088 family; it still is one of the most powerful CPU cards around.

Lately, Seattle Computer has been concentrating its energy on the Gazelle, a high-end machine that runs MS-DOS. This cabinet-sized machine has 18 slots, up to 896K of memory, and an 8-inch Winchester disk. Sales have been mostly to software houses and to users who would have bought minicomputers instead of micros in the past.

Seattle Computer's next step, says Brian Bertlin, is a multi-user version of the Gazelle that runs Microsoft's Xenix. The Xenix system is intended to be compatible with both the UNIX operating system used on many minicomputers and MS-DOS.

But there's apparently other, more modest machines in the works at Seattle as well, although company officials are not willing to talk about details. Given the firm's commitment to MS-DOS and the S-100 bus, it would only be reasonable to expect a machine that combines those areas of expertise.

At Zenith Data Systems, the MS-DOS vehicle is the Z-100, a series of desktop machines with both 8085 and 8088 processors. The series also features high resolution displays, monochrome and optional color graphics, and space for more than 800K of memory. The desktop and low-profile models all use built-in 5¼-inch disks and provide four extra S-100 card slots for expanding or upgrading the system.

The Z-100s are also available in kit form, as part of the Heathkit line under the H/Z-100 name. By putting a system together yourself, you can save hundreds of dollars. The Heathkit manuals are well-known for their clarity. With systems under either Heath or Zenith names, you can add 8-inch disks and an 11-megabyte hard disk.

The Lomas Road

At the end of the circuit on this bus tour is Lomas Data Products, which announces itself as a full-line S-100 MS-DOS company. It produces the S-100 PC, a desktop S-100 system with an 8088 processor and MS-DOS. With its two double-sided 5¼-inch disk drives, 128K of memory, two serial and parallel ports, and a calender, the whole system sells for just under $3,000.

S-100 MACHINES have quicker machine cycles, wider data paths, and speedier disks.

Lomas also makes a range of 16-bit boards, from a $350 single-board 8088 computer with only 1K of RAM to a super-fast 8086-based CPU card with 8087 math processor and 8089 I/O processor. The new Intel 80286 board from Lomas should be 5 to 10 times as fast as an IBM PC.

Lomas has other S-100 MS-DOS products in the works. According to Richard Lomas, the company's president, a single-board system with an Intel 80186 for the CPU, three open S-100 slots, and some bundled software is about ready for release. Pricing was not set when this was written, but the company says it might be less than $2,000.

In the Speed Zone

According to dealers, the two biggest factors that prompt buyers to choose S-100 systems are their fast speeds and great flexibility. Engineers and software developers like the higher throughput and business buyers like the idea of being able to upgrade the system.

Frank Warren says that his Hayward Systems Group is selling computers from both CompuPro and Seattle Computer Systems to engineers in Silicon Valley. Warren says that these users find the Seattle system to be about four times as fast as the IBM PC for programs involving complex calculations. The Seattle system with the 8087 coprocessor adapter is fast

Software Suitable for MS-DOS

What programs can be run on an MS-DOS system without the PC's trimmings?

There seem to be four separate routes to bringing MS-DOS programs to market. They can be done as independent projects, as derivations from PC-DOS, as derivations from CP/M-86, or as recompilations of older CP/M-80 programs. At some software houses, several routes are already in use.

The IBM PC is obviously the most important market for any MS-DOS program. But, as the number of other MS-DOS machines continues to climb, many software developers report they are developing program versions that are not tied specifically to the IBM.

"I'd say just over 50 percent of our PC-DOS programs also come in MS-DOS right now," reports Edward Currie, president of Lifeboat Associates. "This includes most of the spreadsheets, word processors, editors, sort routines, encryption routines, database managers, communications packages, and some utilities.

"But, a lot of products rely heavily on screen graphics that are not available on MS-DOS. If they do come in an MS-DOS version, it's for a particular machine or market."

Digital Marketing, of Walnut Creek, California, sees the same trend. "Virtually all our PC-DOS programs are also available in MS-DOS," says Hal Miller.

That's also the word from software developers. For example, at MicroPro International, the official position is "If we don't have it for MS-DOS, we will soon. We've already done MS-DOS vanilla versions of *Wordstar*, *Mailmerge*, and *Supersort*, and more are in the works."

Like most software houses, MicroPro reports that, although the plain MS-DOS market is a small fraction of the size of the PC-DOS market, it is growing and is large enough to support. In addition, contracts from manufacturers of several 16-bit machines, incompatible with the IBM PC, have pushed some other versions of MS-DOS high up on the priority list. —*S.R.*

enough to replace the use of minicomputers or corporate mainframes in many applications, and economical enough to fit into a department's budget.

Seattle Computer, Lomas, and Computer House representatives all cite sales to software houses as an important market. Because the S-100 machines are significantly faster, software developers can compile larger programs and revise them more often, thereby increasing the speed of product development.

In fact, several software houses privately admit that they do much of their initial IBM PC software development work on fast S-100 systems. Once all the other parts of the program are debugged, the software is downloaded to an IBM PC to develop the screen and keyboard interfaces and do final debugging.

Claims of higher speed for S-100 machines are not just dealer hype, either. The S-100 machines have quicker machine cycles, wider data paths, and speedier disks.

The IBM PC runs at slightly under 5 million internal machine cycles per second (a 4.77 MHz clock rate). The slowest of the S-100 machines can do 8 million comfortably, and many users have no problem running some machines faster than 10 million cycles per second.

Most of the S-100 machines also use the 8086 with its 16-bit data paths. Although internally the same as the 8088 used in the IBM PC, the 8086 can access twice as much information each time it reads or writes to memory. This speeds up processing considerably. The improvement is less than two to one, however, because only some instructions need to access more than 8 bits, and other instructions do not require memory access at all.

Flexible Routing

Increased flexibility is the other strong advantage claimed for the S-100 systems. As Rich Lomas sees it, "The advantage of the S-100 bus over a PC is its ability to upgrade easily. For instance, we've got a 286 board, and you'll be able to plug that in and run MS-DOS on it as well, and take advantage of the increased throughput. Whereas if you buy an IBM PC, and you want to run faster, you're out of luck."

Replacement or add-on CPU cards are available for both the IBM PC and S-100 machines, but up to now, the range of processors is far wider for the S-100. In addition, the design of the systems seems to allow more room for faster processors to use the S-100 bus.

However, in regard to peripheral cards, it seems the IBM PC's bus may already have the advantage. PC-compatible peripheral cards have proliferated at a rapid rate, and will surpass the S-100 choices in quantity before too long.

The End of the Line?

While the S-100 market is not displaying the phenomenal growth of the IBM PC area, it is not dead yet. People are buying S-100 machines both for their own virtues and for the similarities with the PC. As it is used more and more on different machines, MS-DOS may prove to be a sufficiently popular operating system to get out from the shadow of PC-DOS.

On the other hand, most S-100 machines don't offer the graphics and the internal code structure of the IBM PC. The PC and its close adherents have a larger software base, more graphics-oriented programs, and an ever-growing range of supporting products.

Each set of machines has particular strengths and limitations. However, to get to many destinations, you could take either bus. */PC*

Product Information

The following hardware and software products for S-100 bus systems that operate with MS-DOS are discussed in this article. Please contact the manufacturers for further information.

SB-86 (MS-DOS for CompuPro)
Lifeboat Associates
1651 Third Ave.
New York, NY 10028
(212) 860-0300
List Price: $200

CIRCLE 626 ON READER SERVICE CARD

MSPRO
Computer House, Inc.
722 B Street
San Rafael, CA 94901
(415) 453-0865
List Price: MS-DOS for CompuPro, $395; disk controller for 5¼-inch drives, $350

CIRCLE 625 ON READER SERVICE CARD

Gazelle and 8086 CPU Set
Seattle Computer Products
1114 Industry Dr.
Seattle, WA 98188
(800) 426-8936
List Price: Gazelle, $5,995; 8086 CPU Set (including 8086, support board with console ports and EPROM monitor, and MS-DOS), $735

CIRCLE 624 ON READER SERVICE CARD

Z-100
Zenith Data Systems Inc.
1000 Milwaukee Ave.
Glenview, IL 60025
(312) 391-8861
List Price: $2,899 with 128K, one disk drive, and MS-DOS

CIRCLE 623 ON READER SERVICE CARD

H/Z-100
Heath Company
Benton Harbor, MI 49022
(616) 982-3571
List Price: $2,199 with 192K, one disk drive, and MS-DOS

CIRCLE 622 ON READER SERVICE CARD

LDP 72 Floppy Disk Controller and S100-PC Computer
Lomas Data Products, Inc.
66 Hopkinton Rd.
Westboro, MA 01581
(617) 366-6434
List Price: S100-PC including MS-DOS, $2,999; LDP 72 Floppy Disk Controller, $275; MS-DOS for LDP 72, $250 extra

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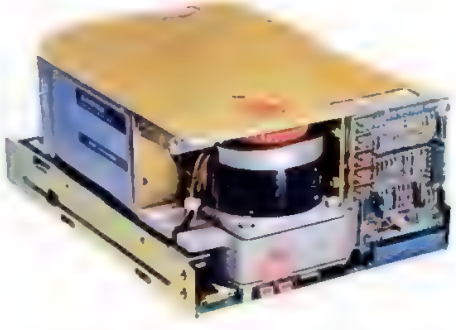
If you buy an IBM XT, it's going to cost you $4,995 for the XT system unit. You'll get 10 megabytes of hard disk storage, one 320 Kbytes floppy disk drive, 8 slots, a $120 asynchronous communication adaptor, 128K of RAM and the three IBM intials.

We recommend instead, that you buy the IBM *PC* for $2,104. You'll get one 320 Kbyte floppy disk drive, 5 slots, 64K of RAM, the same three IBM initials, a space for your dealer to put the Pegasus XT Conversion Kit, and an extra $2,891 to buy it with. But since the Pegasus XT Conversion Kit costs only $1,295 installed, you'll have an extra $1,596 — almost $1,600 — left over. With many compatibles you'll have even more.

But if you already own an IBM PC and were thinking you'd just get the XT expansion chassis, we have a surprise for you. If you add the $1,295 cost of the Pegasus XT Conversion Kit to the $2,104 price of an IBM PC, you can have a second computer — instead of a dumb box — for less than the price of the XT expansion chassis.

Hard Disk Quality

Now, before you start thinking that IBM's hard disk is better than ours, remember that IBM doesn't make their own hard disk for the IBM XT. They go into the marketplace, just like we do, and strike the best price they can. If you were to buy an IBM XT, your hard disk might come from one

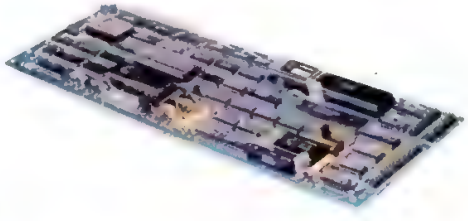


of four manufacturers. It's possible, in fact, that the IBM XT might have the same hard disk that you'd get in our Pegasus XT Conversion Kit.

The Role of the Controller

But the hard disk is not the whole story. It takes a controller card to get your files from the hard disk to your computer so you can use them.

The IBM XT has a good controller card. Unfortunately, it is not designed to take advantage of some of the advances in hard disk technology. Our controller card will work with our 10 megabyte hard disk all the way up to our 140 megabyte hard disk — and everything in between. With the IBM XT controller, you're limited to four manufacturers. The Pegasus controller board, on the other hand, configures to whatever hard disk you may want to install in the future. There is virtually no limit on hard disk size or number of manufacturers you can use.



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PC owners will be able to share in the excitement of videodisk technology as early as next year. What's in store? For starters, brilliant images on wall-sized plasma screens, crystal-clear audio, and interactive simulation with cinematic effects.

There's A Videodisk In Your PC's Future

Imagine your den transformed into a media room of awesome capabilities just waiting for your interactive commands. You sit down at the keyboard of your IBM Personal Computer and power up the whole entertainment center at once. The plasma screen wall in front of you flickers on, and soon you're engrossed in an interactive simulation game with cinematic effects that transport you to faraway adventures. You're surrounded by crystal-clear audio enhancing the believability of the simulation. Of course, you still have to remember to keep the volume down so as not to disturb the rest of the household.

Right now, entertainment systems are being designed that will enable videodisk players, compact digital audio players, stereo systems, projection and plasma TV displays—all in gorgeous color and breathtaking sound—to work with the IBM PC.

Within the next year, you'll be able to hook up your PC to a videodisk player and interact with realistic games that will make the computer game of today seem like a throwback to the Stone Age. Real movie footage will replace crude computer display graphics. High-quality digital sound from your stereo will replace the tinny squeaks of the PC speaker. Wall-sized high-resolution images will dwarf the 12-inch display screen. The PC will become the heart of an entertainment center that will far outstrip anything you have ever experienced in a movie theater.

With a laserdisk player connected to your PC, you will be able to "travel" anywhere in the world, "sit" at the control panel of the space shuttle, "visit" colleges, or "walk" through a haunted house. One day in the not-too-distant future, people will be criticized for spending too much time interacting with their entertainment screens instead of with their families and human friends.

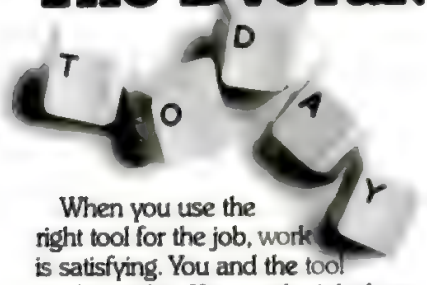
A LASER videodisk player can independently access any one of 108,000 frames on a videodisk.

Interactive laserdisk games are popping up in arcades all over the country introducing people to the interactive video revolution. And very soon, that same technology is going to begin appearing in homes. What many PC owners don't realize is that they don't have to wait years for all this to happen. They can enjoy interactive videodisk adventures with existing equipment. Several consumer and industrial videodisk players are currently available, and there are interfaces that make the players work with the IBM PC. This means that for less than the cost of a 10 megabyte hard disk, you can have an interactive videodisk system tied to your PC.

"So what?" you ask. Admittedly, there isn't much software right now in the form of videodisks and floppy disks to accommodate this type of system, but within a short time, there will be an explosion of activity in this field. One of the major reasons is that a laser videodisk player can independently access any one of 108,000 frames on a videodisk. These frames can be pages of a directory, such as a phone book, or they can be slides and home movies, or, if you're taking a trip, they can be a road map to your destination. The applications are limited only by your imagination.

In addition, a digital videodisk has a potential memory storage capacity in giga-

Stroke The Dvorak



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bytes (billions of bytes). You can be sure that all the heavy hitters in the memory storage business are hard at work making an optical videodisk device that can handle these huge amounts of memory at an affordable price.

The largest drawback to the optical videodisk is its inability to record and play back information in a way that's cost effective. But there isn't much doubt that 2 years from now, viable read/record videodisks will be available to the computer-using masses. In the meantime, manufacturers are experimenting with fixed database delivery systems using premastered optical disks.

A Range of Applications

Unknown to the general personal-computing public, videodisks hooked up to computers are being used with ever-growing frequency by corporations interested in having a more effective means of training their sales forces and employees. It has also proven to be enormously effective in teaching and evaluating students in educational applications. And libraries are already transferring vast numbers of books and large amounts of research information onto videodisks for easy access. Sears even put its enormous retail catalog on videodisk (See *PC Magazine*, Volume 2 Number 3, "Coming Attraction: The Super Video Instructor.")

Last year's World's Fair in Knoxville, Tennessee, used an array of videodisk players hooked up to computerized touch screens to inform visitors about everything from energy conservation to how to find the nearest restrooms. Viewers in one exhibit hall could direct the course of a video debate by touching the image on the TV screen of the panelists they wanted to hear.

THE TOUCH screens can sense the difference between a human finger and a misplaced ice cream cone pressing on the screen.

The largest installation of videodisk players for public use is in Epcot Center at DisneyWorld in Florida. There, hundreds of interactive videodisks, controlled in tandem, educate and entertain visitors. Of course, the Disney people have thought of everything: the touch screens can sense the difference between a human finger and a misplaced ice cream cone pressing on the screen.

The government is actually the largest user of videodisks, since the technology



Panasonic Optical Document File System

lends itself so well to defense training and contingency simulation. When you hear about the "boys at the Pentagon" playing war games, you can be sure they're looking at videodisk images, not mere graphs on their display screens. They've found videodisks to be the perfect way to train soldiers in the operation of sophisticated electronics and land vehicles, such as tanks, without the risk of accidents. In fact, the Defense Department is the number-one funder of research pertaining to videodisk interactivity.

THE Defense Department is the number-one funder of research pertaining to videodisk interactivity.

Local governments also are getting involved with videodisks. The city of Rochester, New York commissioned a set of videodisks that documents each residential property within city boundaries. Residents there soon will be able to go to the nearest office of their Bureau of Assessments and access a video image of their home, along with all the pertinent data about its property appraisal. This is a test usage of a video/database system that other cities might also employ.

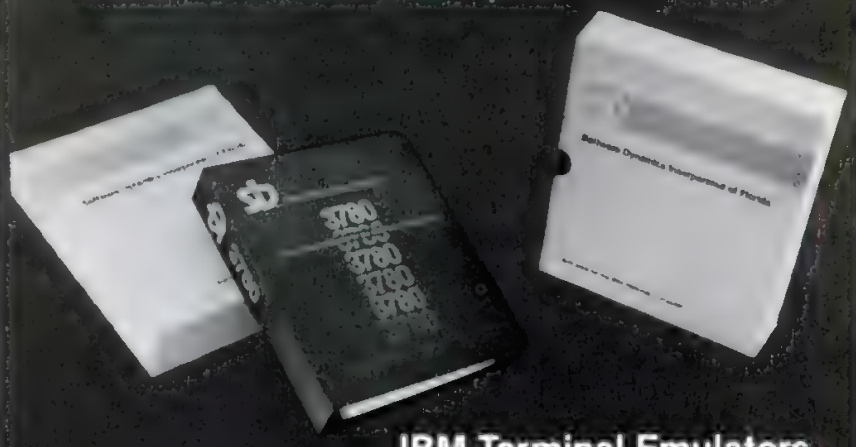
Anyone who has ever gone into an IBM Product Center has probably seen interactive videodisk technology at work. Big Blue decided that a customer information carrel displaying the PC and its virtues on a video screen was the best way to help its salespeople handle questions from anxious customers. In fact, IBM used to be in the videodisk business. It went into partnership with another company to develop and sell laser videodisk technology. But for some reason—it was rumored to be poor management—IBM got out of the videodisk business a few years ago. Since then, laserdisks have flourished: proof that IBM's judgment is not infallible.

Videodisc Players

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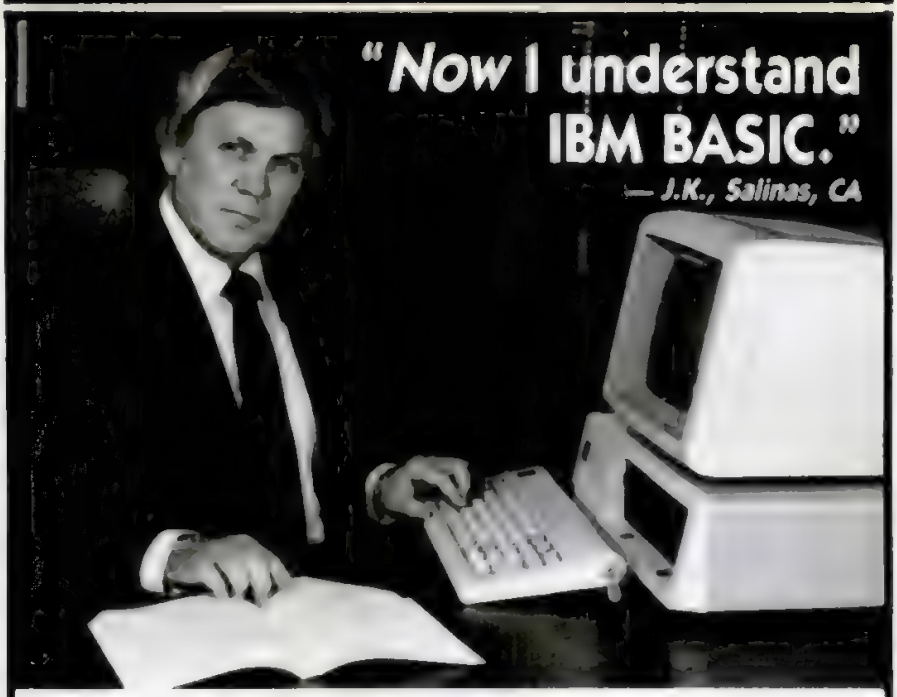
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MOST interactive programming encourages the user to treat the disk as a reference book rather than as a sit-still-and-watch TV show with a strictly sequenced plot.

your PC, a videodisk player, some sort of interface between the two units, and a few interactive videodisks.

Let's start by looking at the videodisk player. The major manufacturers of videodisk players are Pioneer, Sony, RCA, and Philips/Magnavox. All are familiar names from the world of stereos and TVs. You may find equipment put out by these primary manufacturers on the market under trade names other than those of the original producers.

All videodisk players available in the United States fall into one of two categories: laser videodisks or capacitance electronic disks (CED).

Laser Videodisks

Since a laser videodisk offers 108,000 individually addressable frames it can store anything from pages in a book to your favorite slides, to step-by-step demonstrations of a task, such as fixing a bike. Laserdisks have the special ability to store sequences in compressed time and then display them in real time using a variable slow-motion feature. This compressed-time storage feature enables a disk to contain more information on it than the stated capacity of 30 minutes per side in interactive mode.

The real beauty of a videodisk lies in its ability to free us from the linear form of television programming. A user can hop from any point to any point on the disk in a matter of seconds. Most interactive programming encourages the user to treat the disk as a reference book rather than as a sit-still-and-watch TV show with a strictly sequenced plot. Instead of trudging through from start to finish, the user can go directly to the areas of interest.

Individual frame numbers are accessed via a remote-control keypad. The remote controller can put the videodisk player into various modes, such as fast forward, scan, and still/step, in either forward or reverse direction. Also, any individual frame can be called up and displayed for a minute, an hour, a day, or a week with no chance of damaging or wearing down the disk. Contrast this to home videocassette players, with which parking in "still mode" for only 30 seconds can tear a hole through the tape. The "still mode" capability of the videodisk player is made possible by the fact that nothing comes in physical contact with the videodisk except for a beam of laser light that reads tiny indentations pressed into the clear plastic record. These "micro-pits" contain the information to produce a video image far superior to that of any home videocassette player. And the audio quality is derived from the same technology that gave us the compact digital audio disk, which will soon make obsolete the black vinyl records we now use.

Videodisks In The Office

Going a step beyond the word processor, the digital optical-memory disk recorder can store all the material you receive.

Digital OMDR Optical Disc Player Recorder
Panasonic Industrial Co.
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List Price: $35,000 (est.)
Requires: Compatible with PC for data storage. Interfacing specifications still being developed.

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There's no doubt that word processing has already changed the way things are done in the office. You, or the people you work with, may use word processing to create every letter, report, or memo. That's fine for the materials you generate, but what about all the information that comes into the office? Presently, the great majority of those letters, reports, and memos still exists in paper form that typically clutters the work environment.

Wouldn't it be great to have a way to reduce all that paper-based information into electronically-stored data that can be integrated and managed in the same way you work with your self-generated information?

Well, Panasonic has come up with the answer. It has just introduced a complete office system that can *optically* store up to 10,000 letter-size documents on a special 8-inch disk. A single semiconductor laser "shades" information on a thin film of tellurium-oxide for one-time use. This method, called Direct Read After Write (DRAW) enables immediate access to stored information, unlike microfilm or microfiche systems, which require time to process the film.

Letters, pages of a report, or any printed matter can be stored in the digital optical-memory disk recorder by using a scanner to input character information. The documents can then be called up on a monitor, printed, or sent and received by facsimile. That way, a document need never exist in any form other than in the disk's memory. Whenever you want a copy of that particular document, all you need do is go to the copier and print one—or a hundred. In addition, the recorder will accept digital data from a computer, video still-frames, and even X rays.

It takes less than half a second to retrieve data on the 8-inch disk, which has a memory capacity of 700 megabytes, and soon the disks will have the capability of repeated recordings.

Sony soon will be introducing a DRAW system of its own that will be capable of using its existing LDP-1000 laserdisk player to read its recordable disks. This will certainly help to make read/write laserdisks more affordable and will allow those people who already have a Sony player to make use of the new technology.

Several other companies, among them McDonnell-Douglas, Teac, and RCA, are working on optical recording systems of their own. In the next few years, a flurry of activity in this field will make metal filing cabinets, hanging file folders, and trees much less useful in the office. —*A.S.*

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Various Videodisk Models

Buying a videodisk player is like buying any other peripheral: the more it costs, the more it'll do. Pioneer used to sell a computer-compatible videodisk player, the VP1000, for a mere $400. Alas, Pioneer no longer sells that model, and the consumer unit they replaced it with, the LD-1100, is virtually the same machine in a more attractive housing. But not exactly the same, since Pioneer didn't provide the stereo mini-jack that enables the PC to hook up to the videodisk player. In any case, Pioneer now has an awkward coupler to try to make up for their oversight, but I don't recommend it.

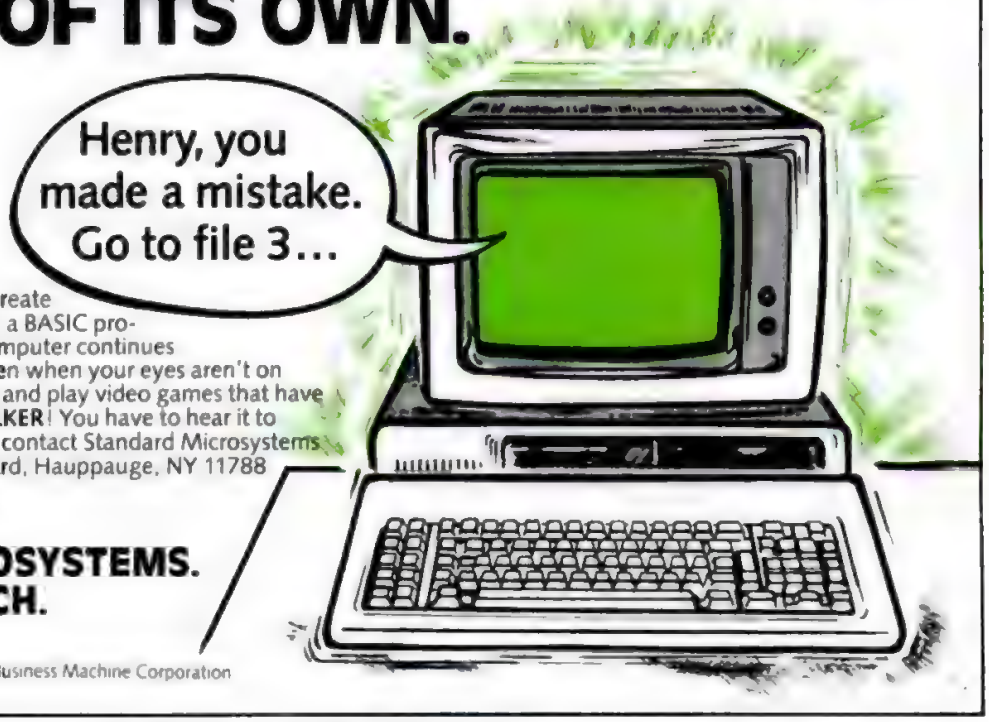
Magnavox has a consumer player, the VC8010, which looks almost identical to the Pioneer unit, has the same inner workings as the LD-1100, and yes, it even has the all-important remote jack (see Figure 1). What's better is that the 8010 sells for $749 or less, depending on the deal you're able to get. At the moment, the Magnavox unit is definitely the best buy for your



Figure 1: The Magnavox Videodisc Player, MAGNAVISION, Model VC8010GY.

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Interface Comparison Chart

Company Product	Compatible Players	Features	Software	Video Display Software Switchable	Notes	Retail Price	
Allen Communications Universal Video Controller	All laserdisk players.	Control of several videodisk or videotape machines simultaneously. Also accepts four audio sources, graphics overlay on Profeel monitor.	Controlling software. Simple commands.	Yes	This is an industrial model with lots of options. Wonderful if you can afford it.	$1,200	CIRCLE 641 ON READER SERVICE CARD
Digital Controls, Inc. Red Max	All laserdisk players.	Many of the same features as the UVC above. Allows three different computers to interface simultaneously. Two players controlled.	Controlling software. Simple commands. Can program.	Yes	Extremely capable device at a reasonable price. The one to get for serious playing.	$855	CIRCLE 640 ON READER SERVICE CARD
Interactive Research Corporation Serial Card Jumper Mod.	Magnavox VC8010 PR 8210 and other industrial models.	Extreme simplicity. Low cost	Has a whole line of interactive software coming out.	Yes	Information on installing the jumper can be obtained from the company. No details on software yet.	Undetermined (very low cost)	CIRCLE 639 ON READER SERVICE CARD
New Media Graphics Discmaster 1000	Magnavox VC8010 PR8210 VP1000 LD-1100 w/adapter. Any other unit with a mini-jack plug.	Very simple interface. Works with consumer players.	No. You have to come up with your own software to make it run.	No	This is the most affordable, simplest interface presently available. Comes closest to being a consumer model. Lacks software.	$395	CIRCLE 638 ON READER SERVICE CARD
On Line Computers Interface	PR8210 and other industrial models.	Touch screen, joy stick capabilities.	Pilot Plus An easy and complete authoring language designed for use with videodisk players.	Yes	This interface was developed for in-house industrial uses and is just being made available to consumers. The software is important and can be used on a variety of players.	$350 (est.) Software separately $150	CIRCLE 637 ON READER SERVICE CARD
Pioneer IF-1000	Universal for laserdisk players with a remote control mini-jack.	Extreme simplicity. Transparent use.	Simple commands. No authoring provisions.	Yes	This unit is still in the prototype stage with no definite plans for release.	Undetermined (low)	CIRCLE 636 ON READER SERVICE CARD
RCA and Licensees Interactive Interface	SelectaVision 400	Complete control of player via complex communication.	Under development. Written in FORTH. No plans for release. One-word commands.	Yes	RCA has developed a very simple interface for the PC, which would cost little to produce, but both the software and interface are not available yet.	Undetermined (low)	CIRCLE 635 ON READER SERVICE CARD
Sony Serial Interface	LDP-1000	Actually not an interface, but a "null modem" serial cable.	Sony uses Pilot Plus (see On Line Computing for details).	Yes	Not really an interface at all, since it is just an RS-232 cable between the machines.	Undetermined	CIRCLE 634 ON READER SERVICE CARD

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THE *Pioneer PR8210 is so popular that it's hard to find one to buy.*



Figure 2: Pioneer LaserDisc Player PR8210.

money. You'll be able to get a start in interactive video for a modest investment.

Among industrial models, Pioneer has a very nice player for $845 (see Figure 2). The Pioneer PR8210 is increasingly the standard model for which interfaces for industrial applications are being designed. It offers a high level of interactive communication and durable components in a very nonindustrial-styled shell. This unit is so popular that it's hard to find one to buy, especially since the PR8210 can be obtained only from Pioneer Video.

The Porsche of the videodisk world is the Sony LDP-1000, which is shown in Figure 3. Since the Sony unit has an onboard microprocessor built in, the question is, "What can't it do?" When hooked up to a PC, it can put the user in interactive ecstasy, but with a hefty price tag of about $3,000. You could buy another PC for almost that much. Because the Sony player is a high-level industrial model, it can communicate fully with the PC.

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• P403	Epson MX70 or MX80, Microline 82A Printer or Color Computer	89
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• P405	IDS 560 or Prism 132 Printer	109
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• P407	Okidata Microline 83A or 84 Printer	99
• P408	C. Itoh Prowriter 2 Printer	99
• P409	C. Itoh Prowriter (Apple Dot Matrix) or NEC PC8023 Printer	89
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• IB502	IBM Monochrome Monitor	99
• CC50	Case Cart	79
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PHILIPS *was the company that developed laserdisk technology.*

North American Philips (the people who bring you Norelco and Magnavox products) was the company that developed laserdisk technology, which it then licensed to Pioneer. Philips has a laserdisk line of its own, but only on the industrial side of the counter. It will soon be introducing a model, the VP825, which is specifically designed for computer integration. The player works beautifully with the PC. If you can manage to get hold of an 825 player after its introduction next year, you'll have to pay about $1,300 for the privilege of owning it. Even at that price, though, the 825 will be the least expensive laserdisk available that is capable of providing sophisticated communication between the player and the PC via its direct-connect serial port.

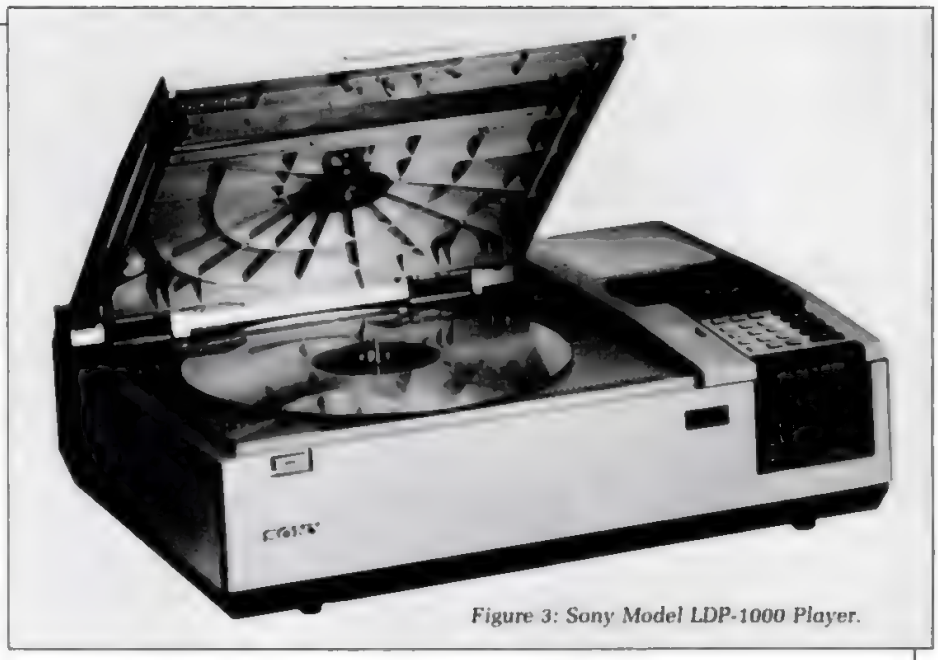


Figure 3: Sony Model LDP-1000 Player.

Nearly everyone has seen an RCA videodisk in action at the local video or department store, and many people have the unit at home. Although the RCA player has proven to be popular with the home video crowd, its entire format, based on a stylus system similar to record technology, has proven limiting.

CED Videodisks

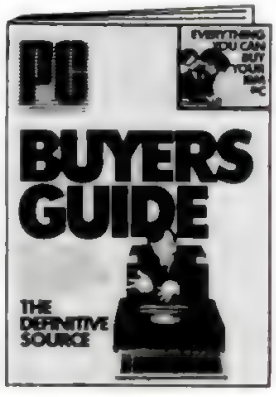
CED videodisks are too sensitive to be handled, and so must be held in protective plastic housings. The player extracts the disk from the housing when the whole assembly is inserted into the player. Instead of frames, the CED system works on the basis of TV picture "fields." Location on the disk is referred to in terms of

Videodisk Players Comparison Chart

Company/Product	Format	Consumer or Industrial	Type of Interfacing Port	Playing Time/Storage Capacity per Side	Notes	Retail Price	
Magnavox VC8010 (same as Sylvania VP7200)	Laser	Consumer	Stereo mini-jack (simple)	30 minutes/54,000 frames	Full-featured consumer model. Best buy for the money. Simple computer interaction via various interfaces.	$749.95	CIRCLE 633 ON READER SERVICE CARD
Philips VP832	Laser	Industrial	RS-232C (complex)	30 minutes/54,000 frames	Least expensive sophisticated player. Won't be available until next year. Very computer friendly. Direct-connect serial port.	$1,300.00 (est.)	CIRCLE 632 ON READER SERVICE CARD
Pioneer PR8210	Laser	Industrial	Serial mini-jack (semi-complex)	30 minutes/54,000 frames	Low cost industrial model More interfaces available than for consumer models. More durable than consumer models.	$845.00	CIRCLE 631 ON READER SERVICE CARD
LD-1100	Laser	Consumer	No direct provision. Has optional optical interface. (simple)	30 Minutes/54,000 frames	Awkard interfacing. Not good for interactive uses.	$800.00	CIRCLE 630 ON READER SERVICE CARD
RCA (and Licensees) SelectaVision SJT400	CED	Consumer	RCA jack (complex)	60 Minutes/27,000 still-field grooves	Has many sophisticated features. Highly computer friendly. Limited format capabilities.	$500.00 (est.)	CIRCLE 629 ON READER SERVICE CARD
Sony LDP-1000	Laser	Industrial	RS-232C Port (complex) Also 1K on-board user RAM	30 Minutes/54,000 frames	Incredibly features-packed. On-board microprocessor. Very computer compatible. Super sophisticated unit. Direct-connect serial port.	$3,100.00	CIRCLE 628 ON READER SERVICE CARD

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time rather than frame numbers. The time reference is more familiar to the average consumer: you can ask the player to find the 23-minute mark in a program, rather than having to juggle frame numbers (such as 29,371), which are accurate but not very easy to use.

Also, the CED system lets you tag a segment of a disk with invisible "flags," allowing you to program unlimited repeats of favorite segments in various combinations.

RCA is now introducing its new line of videodisk players that incorporate interactive capabilities for the first time. The array of commands at your disposal is impressive, and RCA has made provisions for interfacing the PC. There are certain advantages to the CED system, such as 2 full hours of interactive capacity per disk, but when compared with the laserdisk technology, CED disks still come out far behind.

There are several other companies that market videodisk players, such as Sylvania, Hitachi, and Toshiba. New models continue to come out, and they should be compared to those currently available, detail for detail, before you buy. The most important question to ask is, "Can it be hooked up to my computer?"

Interfaces

The interface resembles modem technology, and like a modem, it can come in either a plug-in board variety or as a "black box" intermediary connected between the two machines. Typically, the interface needs a standard RS-232C port on the back of the PC to hook up to, and a

How A Laserdisk Player Works

The laserdisk player utilizes the unique capacity of the laser beam to access the disk at any point you choose.

The way a laserdisk player works is quite amazing. You'd swear it's straight out of some sci-fi film, but no, videodisks are here today—and they work beautifully.

A small, very low-power laser inside the player shoots out a beam of laser light that travels through a series of lenses and mirrors until it is directed straight up into the chamber that houses the videodisk.

> ***THE LASER beam can be directed to any point on the disk, and in a few seconds can traverse the disk to any other point.***

The objective lens glides underneath the disk and focuses the laser beam up at the silver-colored platter, which rotates at 1,800 RPMs. The disk itself is said to be virtually indestructible and supposedly will retain its image clarity forever.

The surface of the disk contains millions of tiny "micro-pit" indentations forming the patterns that are read by the laser beam. This hill-and-valley landscape contains everything within it to let the player know just what video image to produce and which frame and chapter is being read. It even can contain digital programming data, which some players are designed to interpret.

The information, now encoded within the laser beam, is reflected back into the objective lens. The beam then continues down a parallel path to the one it came on and eventually is split off in another direction. A light-sensitive photodiode cell translates this reflected beam's pattern into a bright, sharp video image that can be viewed on any regular TV screen.

The laser beam can be directed to any point on the disk, and in a few seconds can traverse the disk to any other point. This enables the player to find a specified frame almost instantly.

When the PC controls a videodisk player, it sends out 8-bit strings of ASCII code, much as it would when conversing with a modem. The code is interpreted by an interface, or the player itself, and turned into machine-code orders that can be recognized and performed. Higher-level players send back signals to the PC, letting the computer know that it has carried out

THE PIONEER universal interface will be the one to get if you're looking for simple, inexpensive, interactive applications.

matching RS-232C port on the back of the videodisk player. Since some player models have a mini-jack connection instead, there are provisions to accommodate their hook-ups as well.

The way your PC interfaces with the videodisk player is really marvelously simple. By emulating the player's infrared remote control unit, the PC can take control of the videodisk player. It can make the player stop, start, scan around the disk, locate any frame, and hold on to it for as long as you want. The feeling of power can be quite heady. Depending on the type of videodisk player being used, the communication between the player and the PC can be either very basic (send only), as is the case with my VP1000, or the conversation can go in both directions (send and acknowledge), which is why those sophisticated industrial models cost so much. To have a good level of interaction, it's important for the computer to be constantly apprised of what the videodisk player is doing—the acknowledge signal performs just that function. Before the two machines are able to speak to each other, though, the PC needs to have some sort of operating program to define their means of interaction. Here is the weak link in this state-of-the-art technology.

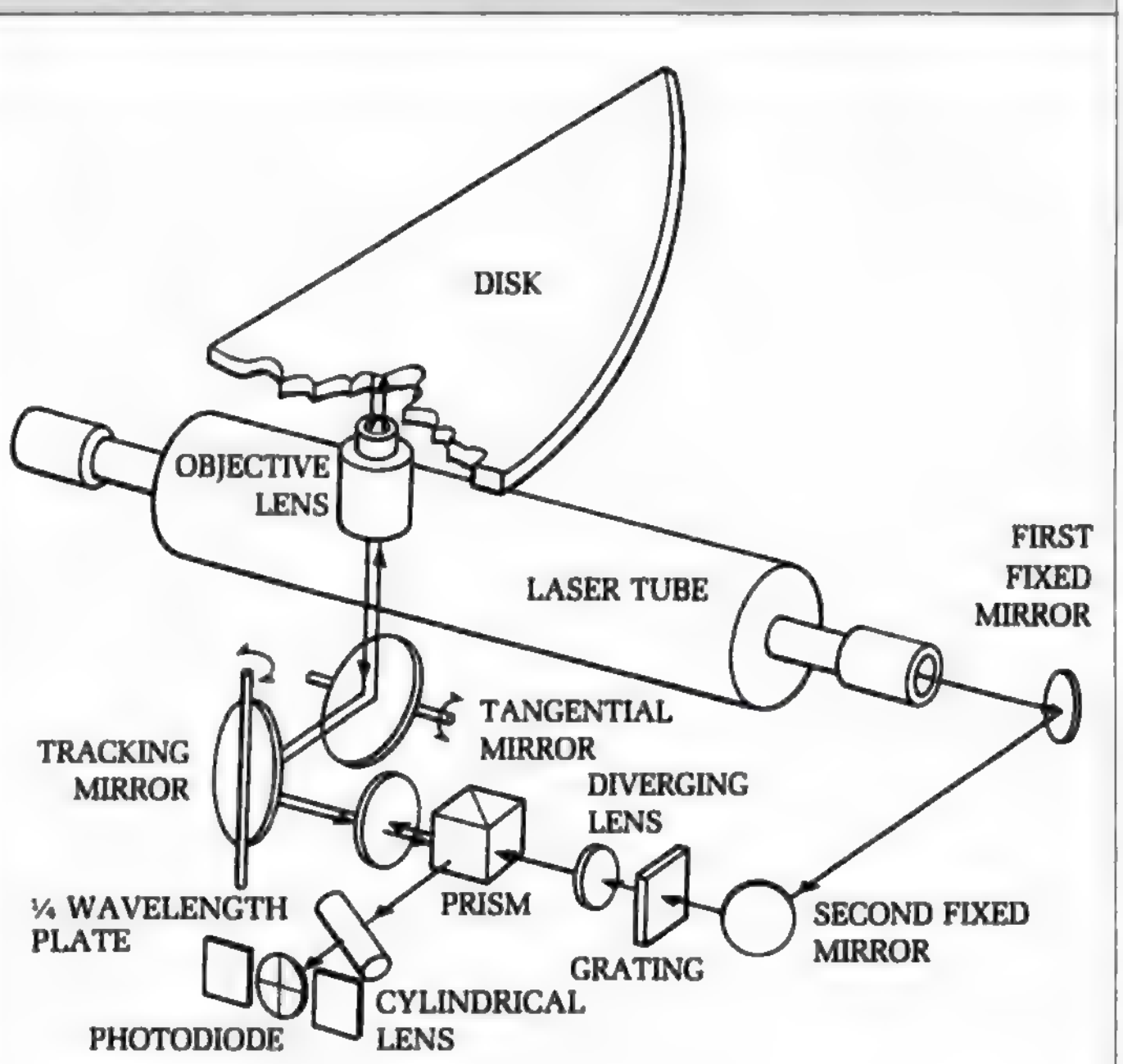
The PC, when properly configured, starts to spew out strings of commands via its serial interface. The player picks up on these commands and carries out the orders. The commands are usually generated in machine language, and then translated into manageable form for the user to put together in a programmed sequence. The key to interactive happiness is the computer program that drives the interface. If it's easy to use, then you're set. But if it's not, then you could be in for a nightmare. One interface manufacturer leaves it up to the user to write the program that will make its product work on the PC. For some, this task is no harder than walking a dog, but for others, forget it. There are those of us who want to be able to plug that interface in, insert the floppy-disk program, and be off and running. Luckily, most interface manufacturers provide guidance in this area, and there are even a few interfaces with very versatile programs.

One group of interfaces will work on any laserdisk player with the remote stereo mini-jack. The New Media Graphics interface is such a unit. One plug goes into the back of the laserdisk player, and the serial connector hooks up to the serial port of your PC. The player is controlled through simple one-letter abbreviations. P means play, and the command string PW 300 W+ means play, wait 300 frames (about 10 seconds), then step forward. Simple, right? Except that New Media Graphics expects PC users to configure their serial ports and write basic programs of their own to execute these simple commands. At $395, though, it's one of the least expensive interfaces—if, and only if, you're good at programming.

Pioneer has a prototype of a universal interface that will be out soon. It'll work with any laserdisk player that has a remote control jack and any microcomputer with a Centronics printer port. The best news of all is that it will sell for a very modest sum. The programming will probably amount to one-letter commands, which the New Media Graphics model also uses. This will be the one to get if you're looking for simple, inexpensive, interactive applications.

the orders and is ready for more instructions. The player can also keep the PC constantly apprised of which of its functions are being used and what it is doing at all times. This is termed "handshaking" communication, and simply means that the PC and the videodisk player were meant for each other. —A.S.

An illustration of the lens-mirror system of a laser videodisk player showing the path of the laser light reflected from the indentations on the disk.



Videodisk Players

Videodisk players come with a variety of features and in a wide price range.

Magnavox VC8010 Laserdisc Player or Sylvania VP7200 Player
NAP Consumer Electronics Corp.
Interstate 40 & Straw Plains Pike
P.O. Box 6950
Knoxville, TN 37914
(615) 521-4498
List Price: $749.95 each
Requires: Serial port, interface.

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VP832 Player
North American Philips Corp.
Optical Videodisc Systems
100 East 42nd St.
New York, NY 10017
(212) 850-5075
List Price: $1,300 (est.)
Requires: Serial port, interface.

CIRCLE 656 ON READER SERVICE CARD

PR8210 & LD-1100 Players
Pioneer Video, Inc.
200 West Grand Ave.
Montvale, NJ 07645
(201) 573-1122
List Price: Players PR 8210 = $845
LD 1100 = $800
Requires: Serial port, interface.

CIRCLE 655 ON READER SERVICE CARD

SelectaVision SJT400 Player
RCA Laboratories
Videodisc Player Control Research
Princeton, NJ 08540
(609) 734-2726
List Price: $500 (est.)
Requires: Serial port, interface.

CIRCLE 654 ON READER SERVICE CARD

LDP-1000 Player
SONY Communications Products Co.
Sony Drive
Park Ridge, NJ 07656
(201) 930-6106
List Price: $3,100
Requires: Serial port, serial-to-serial cable.

CIRCLE 653 ON READER SERVICE CARD

Digital Controls Video soon will be coming out with an interface it calls the Red Max. It allows up to two videodisk machines, or a combination of an industrial videotape player and a videodisk player to be controlled at once. It can accommodate any player, from the Magnavox minijack plug to the Sony serial port, and makes lesser models function more like top-of-the-line industrial players.

The programming language is simple: one word commands control every function the player can perform. When hooked up to a Sony Profeel or KX Series monitor, Red Max can switch between RGB and video outputs displayed on the monitor and even support the overlay of computer graphics on the video image. This is a serious industrial-level interface for an affordable price of $855.

On Line Computer Systems will be offering an interface for the PC and the Pioneer 8210, as well as other industrial players, that also will accommodate touch screens, light pens, or joy sticks. On Line developed *Pilot Plus* authoring language as a simple, yet powerful, tool for programming videodisk interactivity without dealing in programming terms. It is an example of the right kind of software necessary to make the interface hardware manageable. It works on many different computers and videodisk players, and can be purchased separately for $150.

Allen Communications is one of the more established names in this very young field of interactive video. They're coming out with a self-contained interface for the PR8210 and Sony players that does just about anything you'd want. It can switch the TV screen display between the videodisk and computer display outputs via software, integrate audio tape recorders to feed sound over still frames, and control several videodisk and videotape players at once. But all this capability does not come without its price. The Allen Communication Universal Video Controller sells for $1,200.

Because the Sony player already has a serial port, all that is needed for interaction with the PC is a standard serial-to-serial (null modem) cable obtainable at computer stores. Of course, you need software to drive the interface, and Sony has adopted *Pilot Plus*, enabling the user to put together a program sequence controlling the videodisk player without ever using one BASIC command.

The Philips player also has a direct-connect serial port that needs no interfacing. Because of its extremely high compatibility with a computer, it is being used in upcoming arcade machines. Philips has developed a user-friendly program for the PC in conjunction with their industrial player. The programming menu gives a constant readout of what player options are being employed, and asks the user questions about what he or she would like the player to do next. Philips has yet to decide how it will make its software available to consumers.

RCA's CED interactive videodisk also can be interfaced to the PC by way of a special interface card that plugs into the remote jack on the back of the player. The interface consists of two small resistors, which leads one to wonder why RCA couldn't have put them into the player so that no interface would be needed at all. RCA also has developed a programming language for the unit, written in FORTH. Both the interface and the software are still at the development level. There are no definite plans for making either available for consumers yet.

Software is the important factor in interactivity.

Interactive Research Corporation has a novel approach to videodisk interfacing. It contends that you don't really need a separate interface at all. All you need do, they say, is modify IBM's standard serial port card with one small jumper cable, and you're set to interact. Alan Atkins, of Interactive Research, claims that software is the important factor in interactivity, and he's going to be introducing a new line of interactive floppy-disk programs and accompanying videodisks custom-made for PC use. He has just produced an interactive videodisk that teaches how to operate the IBM PC by learning at a workstation equipped with a PC, a laserdisk player, and his software. He plans to sell this workstation to retail stores that carry the IBM PC and to industries for training purposes. The work station also has digital

voice interaction and compressed audio-over-still-frame capabilities. It is a prototype of what we can expect for offices and home entertainment centers of the near future.

The Future

Until recently, computer and television technologies were on two separate tracks. Now they are coming together to form a new communications medium. As of yet, the full potential of this fusion has not been realized.

THE trade-off for being on the leading edge of an exciting new technology is having to put up with crude methods of operation, incompatible components, and clumsy documentation.

Because the area is young and uncharted, there isn't much standardization in the equipment, or in the way videodisk players interact with the PC. For anyone trying to work in this area, the trade-off for being on the leading edge of an exciting new technology is having to put up with crude methods of operation, incompatible components, and clumsy documentation. All these symptoms of an emerging technology will certainly clear up as the field becomes more established and pervasive.

The next generation of consumer players is expected to have serial port provisions for integration with personal computers, so if you can wait a year or so, the equipment will improve. In the meantime, it's an area wide open for experimentation. Granted, the interactive videodisk is still in its infancy, but what a bright future this child has in store for it. */PC*

Ariel Schwartz heads his own independent production firm, Ariel Productions, which specializes in interactive video.

Videodisk Hardware/Software Support Items

The following manufacturers supply support items for the laser or CED Videodisk player.

Interactive Hardware Manufacturers

Universal Video Controller Interface
Allen Communications
140 Lakeside Plaza II
5225 Wiley Post Rd.
Salt Lake City, UT 84116
(801) 537-7800
List Price: $1,200
Requires: Serial port.

CIRCLE 652 ON READER SERVICE CARD

Red Max Interface
Digital Controls, Inc.
5555 Oakbrook Pkwy., #200
Norcross, GA 30093
(800) 441-3332
List Price: $855
Requires: Serial port.

CIRCLE 651 ON READER SERVICE CARD

Serial Port Upgrade
Interactive Research Corp.
2655 Campus Dr., #235
San Mateo, CA 94403
(415) 572-1346
List Price: contact manufacturer
Requires: IBM serial port.

CIRCLE 650 ON READER SERVICE CARD

DiscMaster 1000 Interface
New Media Graphics Corp.
145 Main St.
Cambridge, MA 02142
(617) 547-4344
List Price: $395
Requires: Serial port.

CIRCLE 649 ON READER SERVICE CARD

Interface and Pilot Plus Software
On Line Computer Systems, Inc.
20010 Century Blvd., #101
Germantown, MD 20874
(301) 428-3700
List Price: $350 (est.); software separately, $150
Requires: Serial port, 128K.

CIRCLE 648 ON READER SERVICE CARD

Laserdisks Sources

Optical Programming Assoc.
445 Park Ave.
New York, NY 10022
(213) 508-2745
List Price: $19.95 to $29.95
Requires: Laserdisk player.

CIRCLE 647 ON READER SERVICE CARD

Pioneer Video
200 West Grand Ave.
Montvale, NJ 07645
(201) 573-1122
List Price: $19.95 to $39.98
Requires: Laserdisk player.

CIRCLE 646 ON READER SERVICE CARD

CED Disks Source

RCA Videodisc Division
1133 Ave. of the Americas
New York, NY 10036
(212) 930-4700
List Price: $19.95 to $39.95
Requires: CED player.

CIRCLE 645 ON READER SERVICE CARD

Monitors for Video/RGB System

KX Series monitors
Sony Consumer Products Co.
Sony Dr.
Park Ridge, NJ 07656
(201) 930-1000
List Price: $850-$1,500
Requires: Color/Graphics card, Sony PC-701 interface cable (made just for the PC).

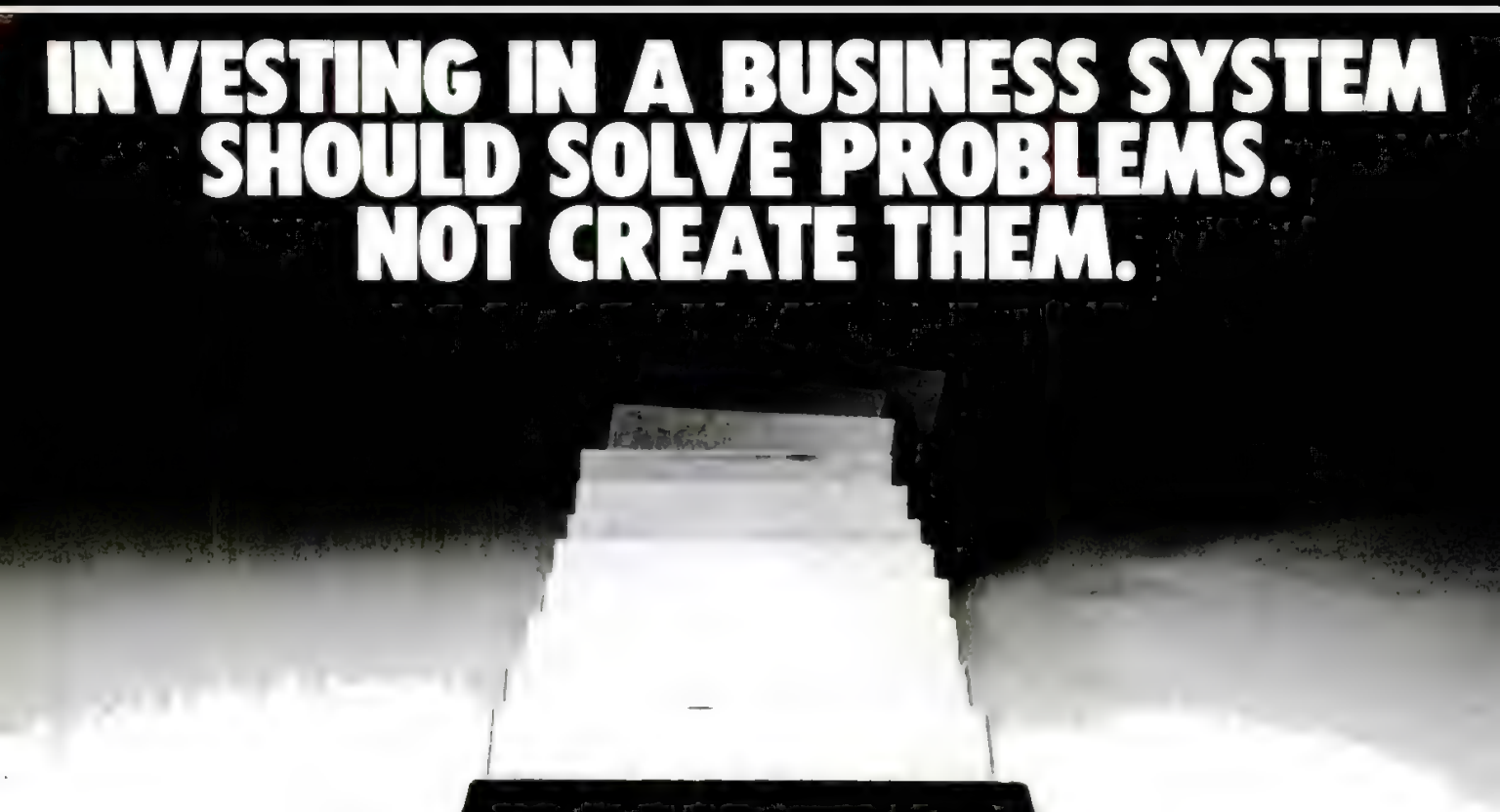
CIRCLE 644 ON READER SERVICE CARD

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Videodisc Update
Meckler Publishing
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Westport, CT 06880
(203) 226-6967

CIRCLE 643 ON READER SERVICE CARD

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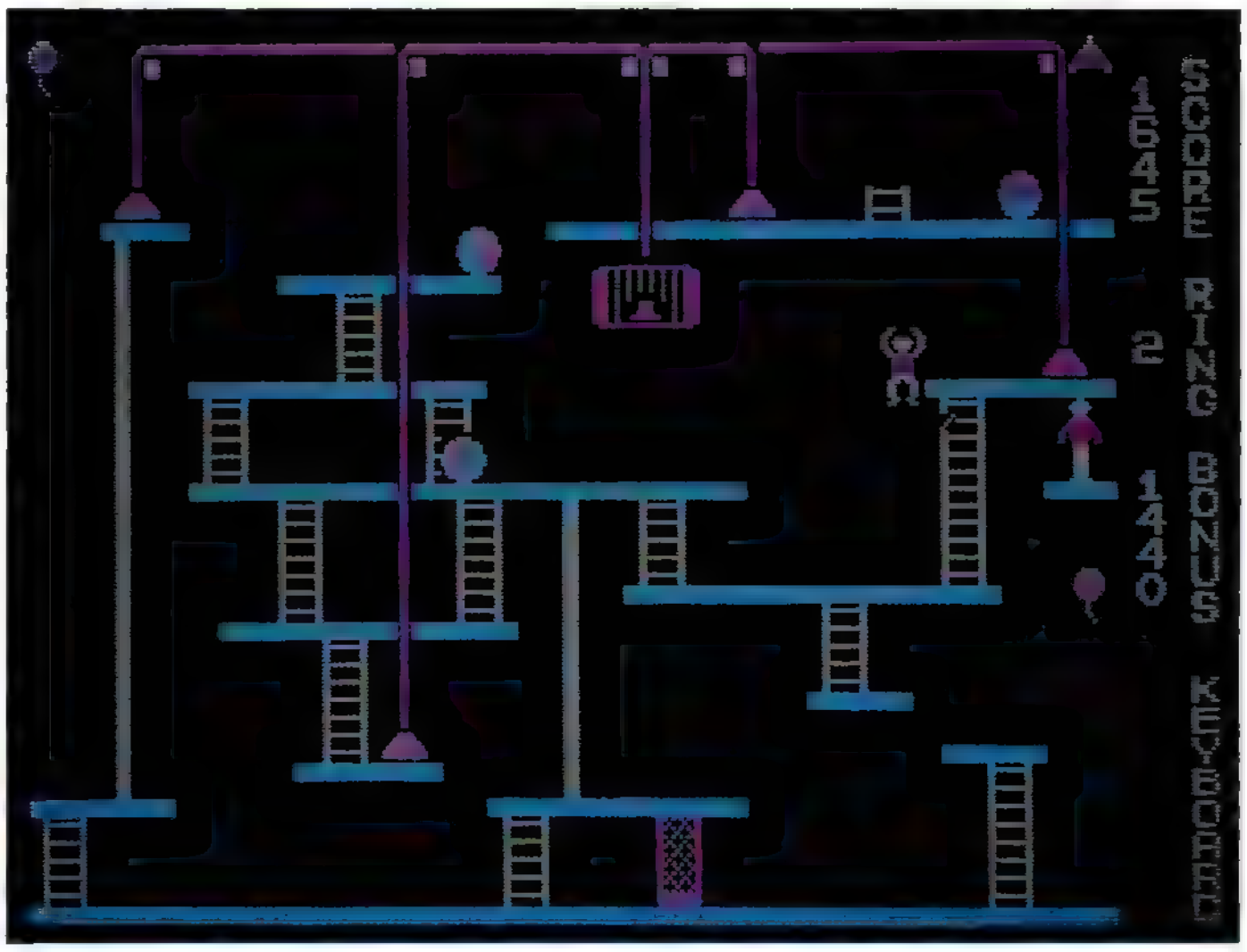
CIRCLE 159 ON READER SERVICE CARD

PC Arcade presents Big Top, a game of circus antics; Buzzard Bait, for those who like dead baby jokes; and Computer Facts in Five, a weak video version of a popular board game.

Under The Big Top

Big Top
Funtastic, Inc.
5-12 Wilde Ave.
Drexel Hill, PA 19026
(215) 622-5716
List price: $39.95
Requires: 64K RAM, one disk drive, color/graphics adapter, joystick and game control adapter optional.

CIRCLE 800 ON READER SERVICE CARD



A claimant to the Greatest Show on your PC, Big Top presents the uneasy escapades of Wendell the Acrobat, here seen dodging the circus clowns.

Ladies and gentlemen and computer users of all ages: Presenting *Big Top*, starring Amazing Wendell the acrobat, the clumsy hatless ringmaster, and the avenging murderous clowns. Yes, folks, for only $5,000, plus $39.95, give or take a few quarters, you can bring forth P.T. Barnum on your very own PC.

Well, as old P.T. once said, "There's a sucker born every minute." This game suckered in a good portion of the *PC Magazine* staff late one Friday afternoon—it provided so much distraction that the executive editor couldn't get to the keyboard to resume play until Monday. *Big Top* is a lovely piece of work, a beautifully designed, barrel-of-monkeys worth of fun.

Like many arcade-type games, the story line on this product is a bit strained. "It was just another day at the circus for Wendell, an apprentice acrobat, until the ringmaster lost his hats and chaos broke loose in every ring! To save the circus, you must retrieve all of the ringmaster's red hats in each ring. But beware: The clowns are out of control! They'll be chasing you, throwing knives, rolling beach balls, and even firing cannons at you! You'll need every bit of acrobatic agility you can muster as you run, climb, slide, jump, fall, duck, and swing your way through the many rings of the BIG TOP!"

As I said, no threat to the fiction best-seller list. Why are the clowns so mad at Wendell? Why did the ringmaster lose his hats? What does it matter? *Big Top* shines in its performance—not in its raison d'être. It's more fun to play than to describe.

Big Top requires 64K RAM and the color/graphics adapter. You can play the game using the keyboard (you can assign

your own keys if you like), but I found it much easier and more enjoyable to use a joystick. Written in machine language, the program's response time was quite good. The disk was copy-protected. *Big Top* was tested on an RGB color monitor; display should be good on a color television connected to an RF modulator, as well.

There are nine levels of play; actually, all that varies is the speed of the characters and objects. I found Level 1 painfully slow, even for a beginner; Level 9 was quite fast, but playable. The consensus of the peanut gallery was that the middle levels were the best for neophytes at the circus. The sound can be toggled on or off; the user can select either of the two IBM medium-resolution color palettes for play, and the game can be suspended with the Esc key. The program appeared to be properly bulletproofed, although I was able to hang it up during the keyboard selection process by calling for a screen print.

Anyway, you're hooked right from the beginning as a cute little opening billboard sets the scene. We see Wendell walking across the bottom of the screen. He comes to a ladder and scurries up to the top; there he grabs hold of the bottom of a billboard and then yanks down a screen full of opening credits. The initial "ring" itself asks Wendell to climb ladders, jump from platform to platform, slide down firemen's poles, and glide from trapeze to trapeze—all in pursuit of the hats—while these angry clowns are scurrying after him. It was relatively easy to avoid the clowns; it was much harder to time the jumps. When Wendell misses the mark or lands too hard, he goes splat and one of three lives is lost. Colliding with a clown costs a life, as does running out the allotted time for each ring.

If you manage to collect all of the hats, a new ladder grows in the upper right-hand corner of the screen. Get Wendell over there and climb, and he climbs into the next screen—another nice piece of programming. The second ring involves collecting the Strong Man's weights and avoiding bouncing beach balls and tossed knives. The third ring includes a tumbler's seesaw and a tubful of water.

All that I can testify to are these three rings; according to Funtastic, the first trio repeats a few times at higher speed and with more clowns and balls and then several other unspecified rings pop up. They don't—and won't—say how many other challenges are included. I'm not sure how much I like that philosophy—I like surprises every bit as much as the next guy, but I also like to have some idea of what I'm getting into when I buy my ticket. A few other nits: The hats and weights and other prizes always appear in the same place in each game, and Wendell always starts in the same position. Although this may help you progress to upper levels by establishing a pattern and a rhythm, I yearned for a bit of variety.

The game is obviously derived from a few of the most popular arcade and home computer hits: The ladders reminded me of *Apple Panic*, the jumping Wendell of the jumping Mario in *Donkey Kong*, and the sound effects of the old standby, *Pac-Man*. That's not a bad lineage. And further, *Big Top* is written by Michael Abrash, author of *Cosmic Crusader* and *Space Strike*, and coauthor of *Snack Attack II*—all three games are standouts in design and execution. Encore!

On the PC magazine rating scale, from a low of one to a high of six, *Big Top* rates:

FUN:	4.5
CHALLENGE:	4.5
GRAPHICS/SOUND:	5.0
TOTAL SCORE:	14.0

Buzzard Bait
Sirius Software, Inc.
10364 Rockingham Dr.
Sacramento, CA 95827
(916) 366-1195
List Price: $34.95
Requires: 64K RAM, one disk drive, color/graphics adapter, joystick and game adapter optional.

CIRCLE 799 ON READER SERVICE CARD

This is a game for people who like dead baby jokes. We don't. *Buzzard Bait* is almost too smarmy for the lowest *National Lampoon* parody.

Yes, folks, some people are convinced the IBM PC was invented for the likes of this: Your job is to destroy the buzzards who are snatching helpless babies off the ground to feed to their young.

Some of the babies don't make it to the nests at the top of the screen and fall back to ground. You can save them by spearing them with your ship before they go splat. You must also avoid "Pushy Penguins" that fly across the screen trying to bounce you off course. (The fact that penguins are flightless birds doesn't seem to faze the designer of this "game." Never let facts get in the way.)

BUZZARD BAIT is almost too smarmy for the lowest National Lampoon parody.

In case you think there's a bit of an overreaction here, consider the cover of the Sirius Software catalog: Among the cartoon characters is a buzzard with a baby in its claws. "I'm hungry," says the bird. "I'm dead!" says the baby.

There are a few more elements to this game—shooting baby birds, shooting flying birds, collecting bonus ships by assembling floating parts—but why belabor the obscene?

One other thing: The display on an RGB monitor is in glorious black and white. This "game" is a translation of an Apple II product, and it seems that time and expense was spared. Then again, it could have been worse. Imagine the color scheme its designers might have chosen. I suspect the game will display some colors on a composite color television.

The playing details, if you *must* know, include a joystick for left, right, or jump off your mother ship; buttons are used to fire and to jump. The game also can be played from the keyboard, and key assignments are reassignable. The program is not copy-protected. Sound can be toggled on or off, and the game can be paused in midcarnage.

On PC's rating system of one to six,



Buzzard Bait enters the dark side of shoot-em-ups.

Buzzard Bait wallows as follows:

FUN:	2.0
CHALLENGE:	2.5
GRAPHICS/SOUND:	2.5
TOTAL SCORE:	7.0

Computer Facts in Five
Microcomputer Games
Avalon Hill Game Co.
4517 Harford Rd.
Baltimore, MD 21214
(301) 254-5300
List Price: $26.00
Requires: 64K RAM, one disk drive, monochrome adapter or color/graphics adapter.

CIRCLE 796 ON READER SERVICE CARD

I wonder what our compatriots over at *Car and Driver* magazine would think if Mercedes announced it would release a line of gut-bucket Chevettes?

This is the second Avalon Hill retread to show up in the Arcade in as many months, and once again it is disappointing to find such a weak translation of one of that company's excellent board games. Last month we spoke of a bear-market *Computer Stocks and Bonds*; this month, we look at *Computer Facts in Five*, which is not nearly so awful, but as of yet has not attained the quality level of its paper-bound equivalents.

Now, understand, I am a "Facts in Five" fan—in the board-game version. I spent many a night in college struggling to think of a Burmese river beginning with the letter *I* (the Irrawaddy) or a National League batting champion whose name begins with F (Carl Furillo, Brooklyn Dodgers, 1953, .344).

THE GAME can be paused in mid-carnage.

The game itself is "trivia" with rules. It is similar to a game called "Botticelli" my family used to play on long car trips to Cape Cod in the summer. The point is to find a person or a thing to match the required alphabet letter, class, and category. There is a 5-minute time period for each player and an appropriately arcane scoring method that comes up with one score to rate a player's "special" knowledge or depth of information for specific classes; a "general" score to compare the breadth of a player's knowledge across many classes; and a "total" score to be used in the competitive mode.

In each round, five classes and categories of subject matter are selected from more than 1,000 choices in the computer's database. The selections can be made on a random basis, or by player A for the bedevilment of player B. The computer then randomly selects five letters (including the possibility of a wild-card letter represented by an asterisk), which takes pressure off the players. For each subject and letter, the player tries to respond with an answer that fits the subject.

One strong point of the computerized version is that it offers a variety of games: normal play, in which the player can move around to answer any question in any order; sequential play, in which the machine moves from top left to bottom right to each unanswered position; random play, also governed by the computer; timed sequential play, with 12 seconds per answer; and timed random play.

There are solitaire versions, doubles versions, and "party" modes. (In the party mode, there is no entry of words from the keyboard; players on the various teams must keep track of their guesses on paper.)

The disk includes both monochrome display adapter and color/graphics adapter versions. The monochrome version is competent, with a small, but readable, display. Time is tracked with a digital clock readout on the bottom of the screen. On the color version, a nice graphic of an hourglass with sand spilling from top to bottom keeps track of the time—a nice reference to the real hourglass provided with the board version of *Facts in Five*. But for some reason, the designers at Avalon Hill chose white letters against a purple background on an RGB monitor as the prime color display. This is, I suppose, an improvement over the white against yellow I found with *Computer Stocks and Bonds*, but still a rather user-eye-unfriendly mode.

A few other detractions: The IBM PC version we received included a two-page instruction sheet on how to convert a TRS-80 Model I diskette to run on a TRS-80 Model III computer. While I found the rig-

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• MULTI-MATE (Soft Word)	$349.00
• CHARTMASTER, (Decision Resources)	$289.00
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CIRCLE 416 ON READER SERVICE CARD

marole rather quaint, I worried about confusion to new users of that other machine, the IBM PC. You had to hunt all the way to page 9 of the instruction manual (printed in light brown on white; does Avalon Hill have stock in the Bayer Aspirin company?) to find the instructions on booting the game on a PC. The instructions ask that you load a DOS system disk in A, enter BASICA, remove the disk, replace it with the *Computer Facts in Five* disk, and type RUN"FACTS". Apparently the designers never considered asking the user to copy over BASICA onto the game disk and, further, have not provided for a simple AUTOEXEC batch file. Here: for free, try this:

```
COPY CON: AUTOEXEC.BAT
BASICA FACTS
^Z
```

And still more confusion. The IBM instructions include a note that reads as follows: "If a communications adapter is installed in your IBM type *BASICA /C:O*" Why? Well, according to the fine print in the IBM BASIC manual, invoking BASIC in that manner disables RS-232C support, in which case no buffer space will be reserved for communications. How much space does *Computer Facts in Five* gain by asking for this unusual extra step? A total of 972 whole bytes! It can't be worth the effort, but the worst thing about the instruction book is that it uses a capital letter "O" in the command—that simply won't work. What the PC is looking for is a zero. Avalon Hill: See page 2-6b, BASIC 2.0 manual. No charge.

YOUR JOB is to destroy the buzzards who are snatching helpless babies off the ground to feed to their young.

There are more nits: Why does the program allow you to enter a word beginning with the wrong first letter? If ever there was a place for a beeping error buzzer, this is one. Why isn't there a line of coding that asks the user whether he wants a color or monochrome version of the game? The only way I could switch back and forth on my fully equipped PC-XT was from outside of the program using a DOS command.

Enough, enough: Avalon Hill, please don't fritter away your reputation. Do it right—I really *want* to say something nice about your products.

On the PC rating scale of one to six, I am subtracting points in the Graphics/Sound category as a penalty for design flaws:

FUN:	4
CHALLENGE:	6
GRAPHICS/SOUND:	0
TOTAL SCORE:	10
	/PC



CIRCLE 443 ON READER SERVICE CARD

BOOK REVIEW/B.T. FILBECK

In the early PC days, the spreadsheet program VisiCalc was considered a reason to buy a personal computer. This popular program is still around and has inspired many books, six of which are reviewed here.

VisiCalc Books

The *VisiCalc* spreadsheet program was one of the most significant influences on the personal computer industry's history. Strong words? Maybe, but they probably are justified. *VisiCalc* was one of the original software packages offered by IBM at the time it announced the PC. Although I don't know the numbers, I would assume that a high percentage of the early PC packages included *VisiCalc*. As the talk of personal computers increased in the media, the *Visicalc* program was often mentioned, and it became one of the reasons to buy a personal computer. The *VisiCalc* program probably contributed to more hardware sales than any other program around during that period.

VisiCalc has been imitated by many other companies, with varying degrees of success. Its manufacturer, VisiCorp, has kept pace itself by releasing *VisiCalc Advanced Version*. The program that started it all is still going strong.

Unknowingly, VisiCorp has provided a livelihood for a bunch of folks across the country. In addition to the program imitators, there were several authors who perceived a need for a book about *VisiCalc*. Their perceptions were wise, and today a number of books on the program exist. VisiCorp itself has even published one, in addition to its manual.

In general, these books fall into three categories. First are the tutorial books, which explain each *VisiCalc* command and give its use. Second are the model and template books, which give detailed lists of the instructions necessary to generate a *VisiCalc* template or skeleton spreadsheet for use with your own data. For an additional charge, these books often offer the templates on a diskette for those who don't want to key in all the necessary information themselves. The third category is comprised of books that combine these two approaches. The authors of these believe that users will best learn *VisiCalc* by both keying in a model, and by studying the commands.

The tutorial books have a limited appeal, since once the user becomes familiar with the various commands and understands the operations of the program, the book has little use. For this reason, strictly tutorial books are not very common. The other two types are popular and can be found on the shelves of most large bookstores. The combination-type books are the most common, so I'll begin with them.



The VisiCalc Program Made Easy
David M. Castlewitz
(Osborne/McGraw-Hill, Berkeley, CA, 1983)
195 pages; softcover; $12.95

CIRCLE 797 ON READER SERVICE CARD

Since the versions of *VisiCalc* available for the different brands of personal computers are quite similar, most authors attempt to expand the market for their books by writing about more than one version. Although this approach usually does increase sales, it entails some sacrifice. In *The VisiCalc Program Made Easy*, the author David M. Castlewitz looks at *VisiCalc* as it applies to the IBM PC, Apple II, Apple II Plus, Apple III, and three different Commodore models. I was concerned primarily with the PC version, and found the explanations of various commands difficult to follow. Sometimes the computer-specific instructions are enclosed in

a gray box, sometimes they are not, and sometimes they are only partly boxed. Very confusing!

Each chapter of this book is divided into several lessons and each lesson covers two or three different *VisiCalc* commands. I found this format conducive to learning the material. Each lesson covers the commands thoroughly, using examples and showing results: so few commands are covered that each lesson is easy to grasp.

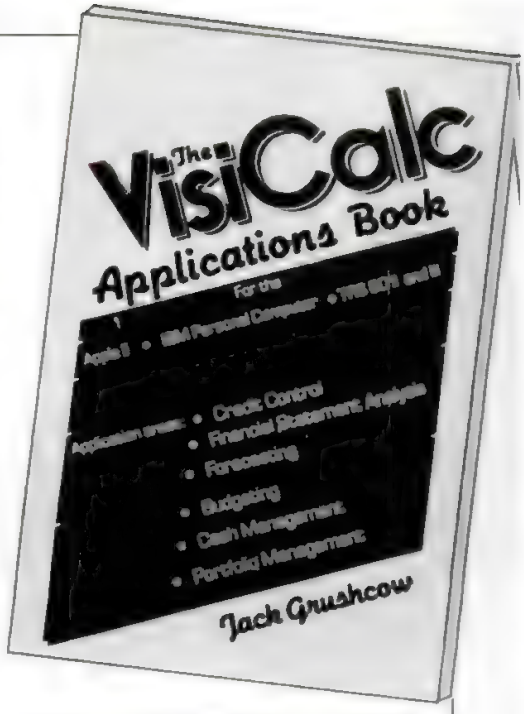
Approximately 60 percent of the book covers advanced functions of *VisiCalc*. Examples are given to explain how these functions are used; some of them are rather interesting and useful. One template, for example, determines periodic payments for various interest rates and terms of repayment.

One chapter, which includes six lessons, covers model building techniques to assist you in building models of your own. This chapter also includes a detailed explanation of DIF files used to transfer *VisiCalc* information to other programs. I found the explanation very thorough.

If you are willing to spend the time to dig your way through the first few lessons and figure out which instructions apply to your computer, *The VisiCalc Program Made Easy* will be a helpful guide to the more advanced functions of the *VisiCalc* program. But if computers and *VisiCalc* are brand new to you, you will probably find some areas of the book confusing.

The VisiCalc Applications Book
Jack Grushcow
(Reston Publishing, Reston, VA, 1984)
276 pages; softcover; $16.95
Models available on diskette for $29.95

CIRCLE 796 ON READER SERVICE CARD



In contrast to *The VisiCalc Program Made Easy*, *The VisiCalc Applications Book* handles the problem of giving computer-specific instructions. It covers the TRS-80 Models II and III, the Apple II, Apple IIe, and the IBM PC and XT. Photos of each keyboard are shown and a description of their differences is given in the chapter, "The Preliminaries." The book's author, Jack Grushcow, establishes some

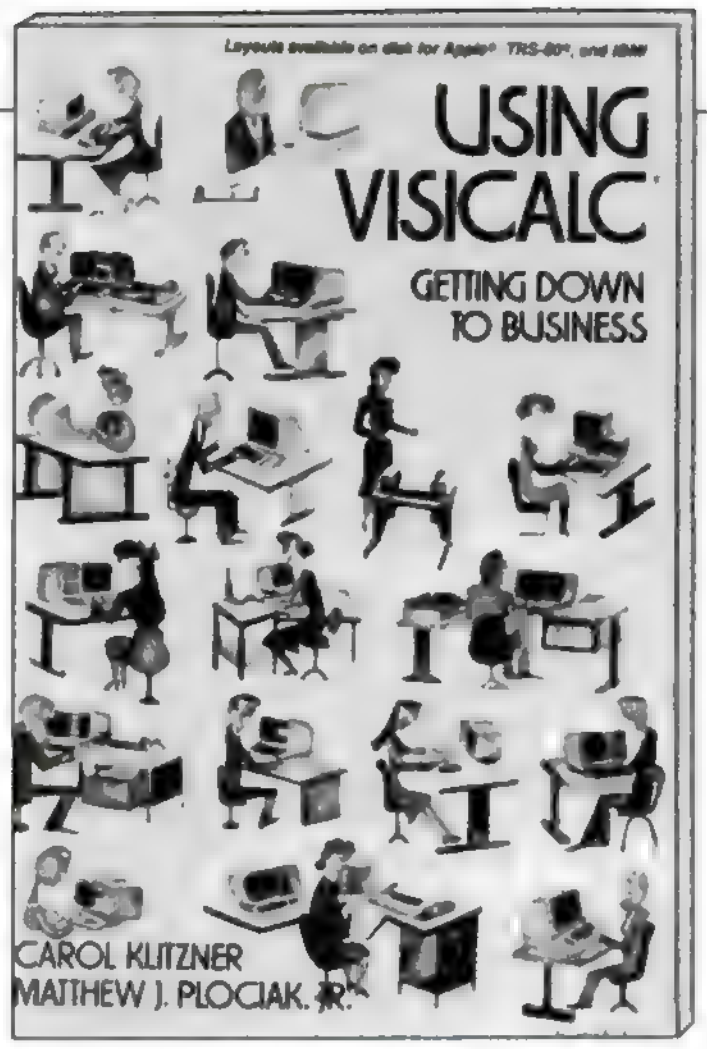
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CIRCLE 523 ON READER SERVICE CARD

standard symbols that apply to all computers, and he uses them throughout the book.

The VisiCalc Applications Book was written for everyone from complete novices to experienced *VisiCalc* users. A section titled, "Why and How to Use this Book" tells you which chapters to read, depending on your experience level. The beginning chapters include very basic instruction and go into great detail. The later chapters describe applications and models, each chapter covering a separate application. The book doesn't discuss most of the program's advanced functions at all; only the @Sum and @Error functions are mentioned in the index. The book teaches you only the minimum commands needed to understand the applications and models presented.

The major problem with this book is that typographical errors appear frequently. They are particularly troublesome in the keystroke-by-keystroke instructions for keying in the Cash Flow model. After trying to figure out the correct instructions



for quite a while, I gave up. It is obvious that the screen pictures shown in the book were not obtained from the same model as the one listed. If the printed directions are followed as given, the model doesn't operate correctly.

The concept behind *The VisiCalc Applications Book* is sound and it is generally well written. But the book has two considerable problems: the incorrect model listings, and the minimum number of *VisiCalc* commands that it covers.

Using VisiCalc—Getting Down to Business

Carol Klitzner and Matthew J. Plociak, Jr.
(John Wiley and Sons, Somerset, NJ, 1983)
277 pages; softcover; $16.95
Models available on diskette for $39.95

CIRCLE 795 ON READER SERVICE CARD

Using VisiCalc gives thorough coverage of all the *VisiCalc* commands and functions and provides several business applications models, as well. It is written for the Apple II, the IBM PC, and the TRS-80 Model III. Computer-specific procedures are enclosed in boxes and clearly labeled. The procedures for the PC are accurate except for the one describing

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how to print the formulas behind the worksheet. It tells you to enter ",P" instead of "LPT1:", which is what really works. Overall, though, the different models and brands are handled very well and should cause you no trouble.

The book is divided into four sections. The introduction gives a brief description of the history of the program and its uses. Section two, "How to Use VisiCalc," covers all the commands and functions in detail. Section three discusses and lists several management applications or models. The details of the models shown in this section can be found either in the appendix or on the optional diskette, which may be purchased for use with the book. Section four describes *VisiCalc Advanced Version* by listing its major changes from *VisiCalc*, including the operation of the new commands.

OVERALL, Using VisiCalc—Getting Down to Business is an excellent value and has no major faults.

I found that the "How to Use VisiCalc" section of the book was an excellent tutorial on the use of the program. All the commands were covered clearly and sufficient details were given. The text is accompanied by pictures of *VisiCalc* screens, which help teach the topic being covered. The end of each chapter has review questions and a practice exercise, to reinforce what was learned, and a summary chart showing all the commands covered to that point.

The management applications section covers such applications as forecasting, cash flow, break-even analysis, and more. My biggest complaint with the entire book is that the examples shown in this section are copies of a poor dot-matrix printout and are very difficult to read. Aside from this, though, the section is excellent. Each of the applications is well explained and the model listings in the appendix are clear and easy to read.

Overall, *Using VisiCalc—Getting Down to Business* is an excellent value and has no major faults.

VisiCalc for the IBM Personal Computer
Edouard J. Desautels
(Wm. C. Brown, Publishers, Dubuque, IA, 1983)
155 pages; softcover, spiral bound; $16.95
Models available on diskette for $39.95

CIRCLE 794 ON READER SERVICE CARD

VisiCalc for the IBM Personal Computer was written exclusively for the PC, and in some ways, the lack of the need for computer-specific instructions makes the

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You Can Talk To Us!

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book a lot more readable than some of those reviewed here. However, readability is one of its few redeeming features.

I found the sequence of topics haphazard and disconnected. The author, Edouard J. Desautels, randomly jumps from one command to another, without any logical reason for doing so. While all the commands seem to be discussed, most of the explanations are a little sketchy. The examples, which the author calls Case Studies, were trivial in comparison to the application models in some of the other books discussed here.

None of the applications were complex enough to require the use of the optional diskette, so you might wonder what it's for, especially at $39.95. At the end of the book the author says: "The optional diskette may be helpful for those of you who can't spare the time to do any avoidable typing, or those of you who will do anything to avoid typing." But if you use the diskette, instead of typing in the information as you go through the book, you will miss out on the benefits the book offers.

VisiCalc for the IBM Personal Computer is spiral bound and lays open nicely on the table while you use it, but this is perhaps its biggest plus. It might be sufficient as a review book for those who already understand *VisiCalc*, but it wouldn't be much help to a beginner.

It is obvious that each author of the combination-type book has his or her own idea of what constitutes a good approach to the teaching of *VisiCalc*. A book of this type should, as a bare minimum, cover all the *VisiCalc* commands and functions in a clear and concise manner and give accurate instructions. Of these four books,

IF YOU USE THE diskette, instead of typing in the information as you go through the book, you will miss out on the benefits the book offers.

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CIRCLE 304 ON READER SERVICE CARD

Using VisiCalc—Getting Down to Business by Klitzner and Plociak is, by far, the best of the lot. If you are looking for a book that will give clearer instructions for *VisiCalc* than you were able to get from the manual that came with your program, try this one.

The template and model books, which make no attempt to teach any of the *VisiCalc* commands, are also popular with *VisiCalc* users.

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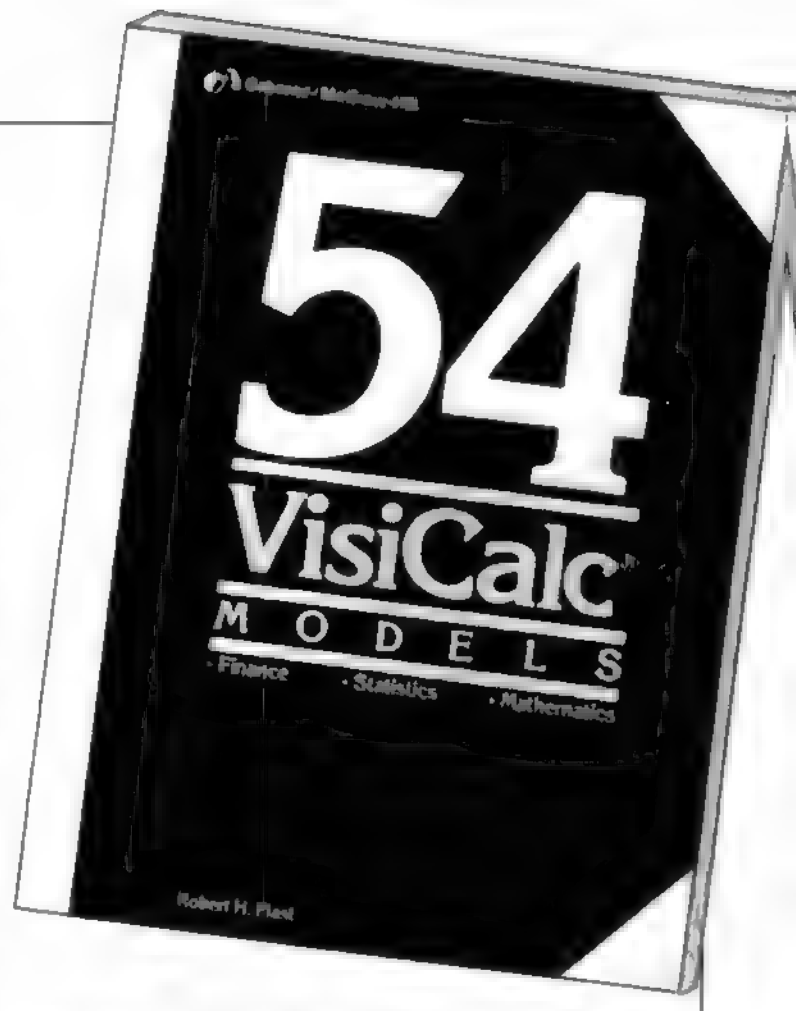
54 *VisiCalc Models*
Robert H. Flast
(Osborne/McGraw-Hill, Berkeley, CA, 1983)
277 pages; softcover; $15.95

CIRCLE 793 ON READER SERVICE CARD

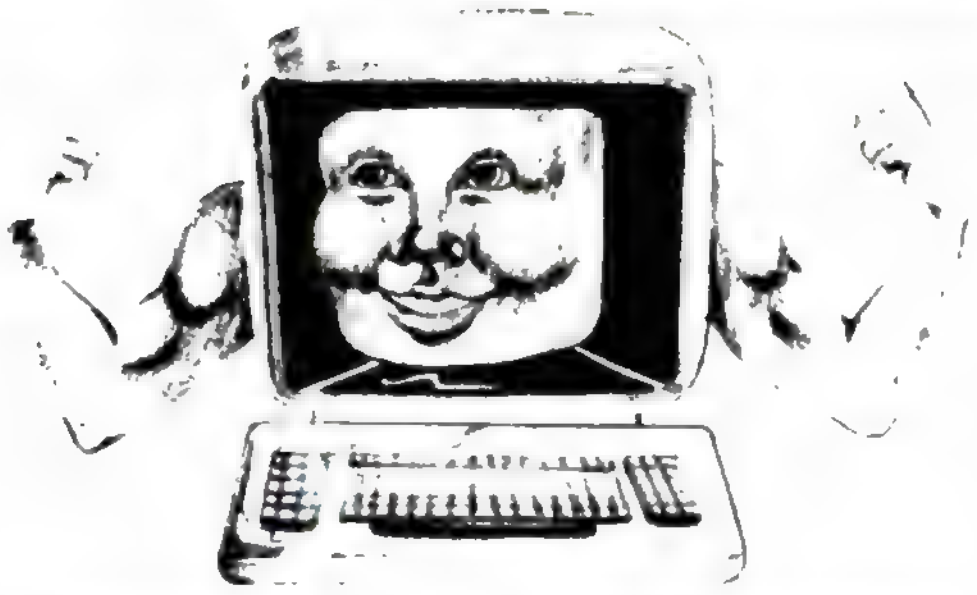
The models included in *54 VisiCalc Models* tend to be short and, in most cases, uncomplicated. They are divided into three categories: Financial Applications (23), Statistical Applications (16), and Mathematical Applications (15).

The format of each model is standardized throughout the book. Each model starts with a description of the application, including any necessary equations. The description is followed by some sample problems, which help make clear the kinds of cases for which the application might be useful. The next two areas show a template without any of the blanks filled in, and the results of the sample problem. The final area is the template listing. The listings range from a page of short lines to several pages of complex formulas.

The financial applications include a variety of models, such as Effective Interest Rate on Investments, a Mortgage Amortization Table (which is limited to 91 payments), and a Tax Depreciation Schedule. Models are provided for calculating the mean, variance, standard deviation, linear, geometric, and exponential regression in statistical applications. Included in the mathematical applications is a model for finding the greatest common denominator of two numbers, one that calculates the area of a polygon, and one for anglo/metric conversion. The book offers a wide spectrum of models, but probably only a few will be pertinent to your needs.



All the models that I tried worked as specified, and I found no typographical errors in the listings. If you have a need for any of the models listed in the table of contents, *54 VisiCalc Models* may be worthwhile for you.



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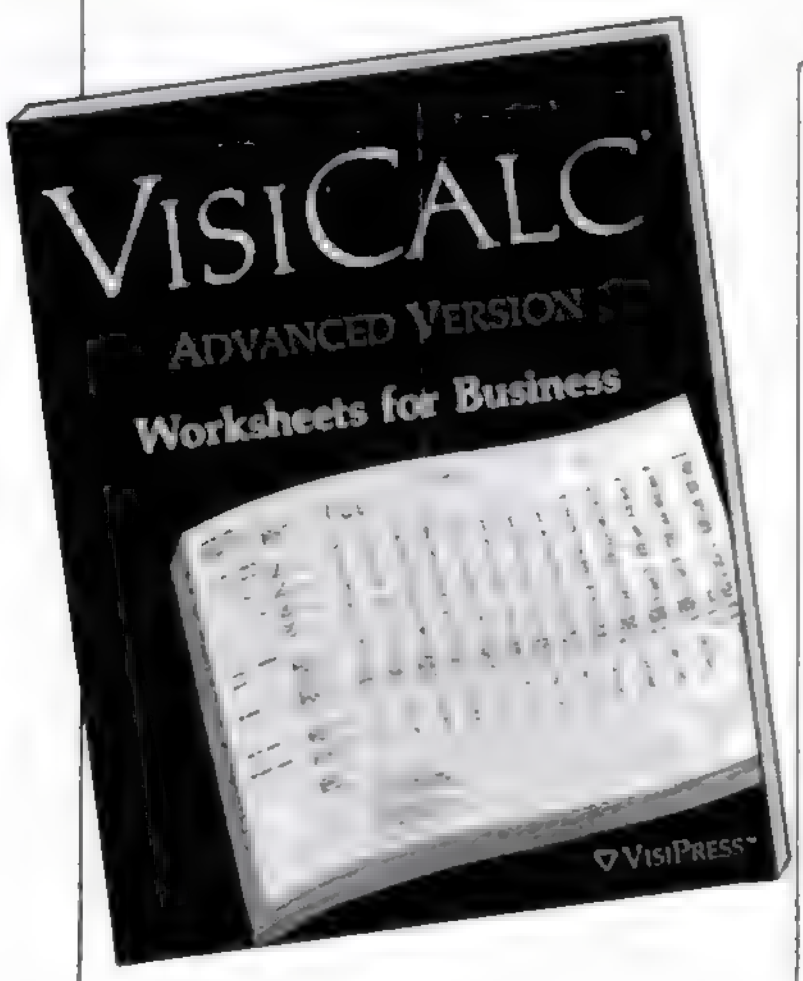
CIRCLE 233 ON READER SERVICE CARD

VisiCalc Advanced Version—Worksheets for Business
Van Wolverton
(VisiCorp, San Jose, CA, 1983)
238 pages; softcover; $18.95

CIRCLE 792 ON READER SERVICE CARD

VisiCalc Advanced Version—Worksheet for Business was written by Visicorp for users of its second *VisiCalc* product, named in the title. I include it here for two reasons. First, the models it contains can be converted to the original *VisiCalc* without too much difficulty. Second, it gives you a good idea of the features *VisiCalc Advanced Version* includes and shows how they relate to a business model.

The worksheets included in this book differ greatly from the ones in *54 VisiCalc Models*. These worksheets are all business-oriented, quite complex, and rather lengthy. Van Wolverton, the author of the *Advanced Version* book, includes 12



worksheets and devotes an entire chapter to each. The applications he discusses include Calculating Your Net Worth, Estimating the Cost of a Job, Forecasting Sales, and Developing a Business Income Statement.

Each chapter gives a detailed description of the worksheet and the application being discussed; instructions on how to use the worksheet after it is completed are included as well. A section also describes how the formulas for each particular worksheet operate. How to enter the worksheet is described on a keystroke-by-keystroke basis, but if you don't have *VisiCalc Advanced Version*, you must do some editing of this section as you go along. You should be very familiar with *VisiCalc* if you plan to convert many worksheets this way. A listing of the contents of each cell of each worksheet is included in one of the appendixes, in case you find that your keying has left you with some problem.

If you operate a business, this book contains some worksheets that will be useful to you and will probably convince you that you need *VisiCalc Advanced Version* (maybe *that's* why it is published by VisiCorp). The book is well written, clear, and concise—a good choice for any small business operation.

THIS BOOK WILL probably convince you that you need VisiCalc Advanced Version (maybe that's why it is published by VisiCorp).

More for Your Book-Buying Dollar

There are many books around that will enhance your knowledge of the *VisiCalc* program, and this article has touched on only a few of them. The key to buying the right book—the one that will best meet your needs—is to clearly identify your needs. If you can do that, maybe you'll get more for each of your book-buying dollars. With computer books, now priced in the $10 to $20 range, getting what you pay for is becoming much more important. Good browsing and happy buying! */PC*

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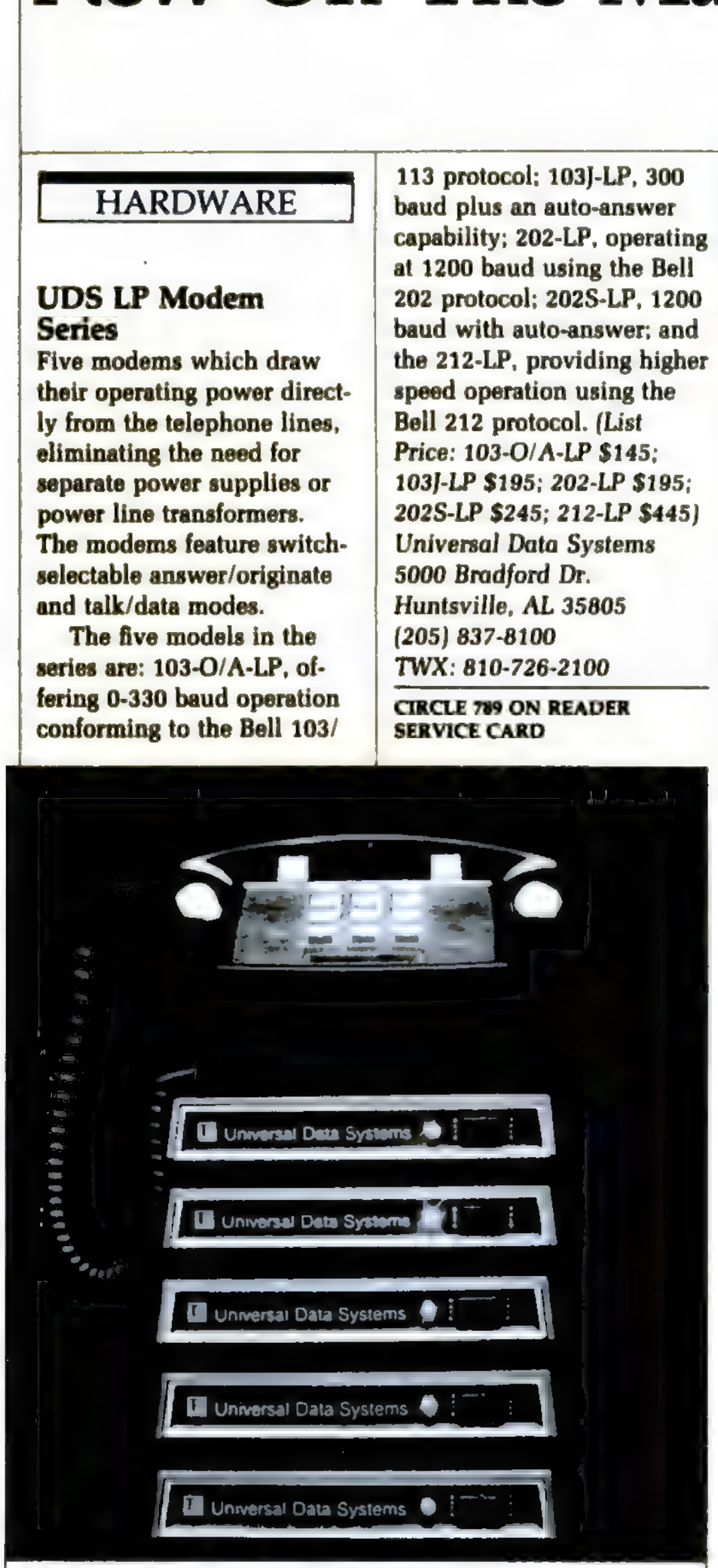
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CIRCLE 789 ON READER SERVICE CARD



LP Modem Series, Universal Data Systems



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Internally, the Analyzer has switches that allow cross-wiring of connections. The unit is a plug-in type adapter that may be left permanently wired in any circuit. *(List Price: $149.95)*

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CIRCLE 789 ON READER SERVICE CARD

Submissions to "New On The Market"

Inclusion in "New on the Market" is at the exclusive discretion of the PC Editorial Staff.

PC Magazine cannot guarantee publication of a product announcement for a particular issue. In any case, submissions of material for "New on the Market" must be received no later than seven weeks in advance of the first week of the issue month. For example, for the January, 1984 issue, all material must be in our hands no later than the middle of November, approximately 2 weeks before the ad closing date.

Submissions must include retail price, distribution methods, and details of required hardware and software. Include a phone contact for both marketing and technical questions.

The details for the product announcement should be submitted in typewritten form, double-spaced on one side of the paper. Whenever possible, include 8×10 glossy photograph of the product in black & white. If applicable, include screen photographs. For best quality, direct camera screen images are preferable to photographs from the monitor.

All material should be sent to: **New on the Market, PC Magazine, 1 Park Ave., New York, NY 10016.**

New On The Market

Light Pen

A light pen with electronic tip switch, applicable as an input device for plotting continuous or point-to-point graphics, selecting menu items, and moving objects around the screen. It can also control movement of the cursor and initiate programmed zoom of objects or of the entire screen.

When the light pen is touched to the screen, light produced by the beam is detected, amplified, and shaped into a TTL level pulse. The leading edge of this pulse triggers the switch circuit, which drops out when the pen is removed from the screen. Ambient light or contact with other objects cannot hold the switch circuit active.

The pen features fixed sensitivity. Under proper program control, it requires no adjustments to either the pen or the CRT display. It responds to all screen colors except black, and luminence levels can be compensated for through software adjustments of the delay time between detection of the switch and the reading of the pen coordinates. *(List Price: $39.95)*

Personal Computer Products, Inc.
2600 N.W. First Ave.
Boca Raton, FL 33432

CIRCLE 773 ON READER SERVICE CARD



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The device is compatible with an extensive range of graphics software. However, should users wish to do their own programming, the HP 7475A allows over 50 HP-GL (Hewlett-Packard Graphics Language) commands covering pen movement, character selection, area fill, and scaling. *(List Price: $1,895)*

Hewlett-Packard Co. Inc.
(Check telephone listings for local sales office)

CIRCLE 779 ON READER SERVICE CARD

CLASS-PC Security System

An access control system, built around a modified PC, providing a means for facility management and attendance data collection. The system provides the user with a tracking ability by which data and activity at entrances and exits can be retrieved by door, card number, date, and time. This information can be provided in report form, which can be printed simultaneous to system activity.

CLASS-PC, an acronym for *Computerized Limited Access Security System for the IBM PC*, has sensor points available for alarm monitoring, as well as output points used either in response to an alarm or activated by time of day. When used as a time clock, CLASS-PC collects data by badge entries and stores it for later use in payroll systems. *($12,500, with PC)*

Requires: 128K, two disk drives, PC-DOS, clock/calendar card.

Applied Realtime Systems, Inc.
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(504) 456-0660

CIRCLE 785 ON READER SERVICE CARD



Wordstore Data Buffer, Production Technology International

Wordstore Data Buffer

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Automatic Switching Unit

A switching device permitting either manual or automatic selection of peripheral devices through the user's system. The unit allows unmanned operation of peripherals under software control. Networking capability is enhanced through a specialized line driving function. When linked to a user's system via modem, the Automatic Switching Unit permits remote site peripheral selection and operation.

The device incorporates self-diagnostic routines, fixed or automatic baud rate selection, user-defined port names (by which peripherals may be selected instead of by port number), user-selectable response format for computer-controlled switching, and a user-selectable identity code for secured access to peripherals. Available as options are front panel L.E.D. status indicators, manual override, display of selected port number, as well as a battery back-up power supply.

The unit is available in three models, with three, five, or seven ports. *(List Price: $459-$866, depending on number of ports and options selected)*
Giltronix
3780 Fabian Way
Palo Alto, CA 94303
(415) 493-1300
Telex: 34 5542

CIRCLE 782 ON READER SERVICE CARD

GPIB-PC

An IEEE-488 instrumentation interface with software. The interface is provided on a plug-in card that occupies a slot in the user's system. It incorporates an NEC 7210 GPIB controller chip and a Programmable Array Logic chip, with a mimimum number of circuit elements and only 8 I/O addresses. The card can support data transfers between the circuitry and the user's RAM and disk memory at rates up to 300 kilobytes per second.

Included software consists of a handler under PC-DOS 2.0 and subroutines that may be called from an application program written in BASIC, 8088 Assembly, Pascal, Fortran, or C. In addition, an interactive control program is provided as a software development and debugging tool. The control program may be used to learn GPIB device programming, to measure system performance, to debug application programs, or to locate a malfunction on the GPIB card. *(List Price: $385)*
National Instruments
12109 Technology Blvd.
Austin, TX 78759
(800) 531-5066
(512) 250-9119

CIRCLE 776 ON READER SERVICE CARD



GPIB-PC, National Instruments

New On The Market

The Graduate

A system expansion device incorporating a Z-80B microprocessor, a fixed 5Mb hard disk drive, 320Kb of RAM, four RS-232 communications channels, an IEEE 488 interface, and a Centronics parallel port. Also included within the unit is *Unisyn* software, consisting of a unified applications generator, a hierachical database manager, a data dictionary, a file manager, and a programming language utility. The combined hardware/software package allows a user to create custom applications without complex programming procedures. The user can input screens in business form format, then enter data on forms saved on disk. *Unisyn* also offers password protection, multi-level coaching, and help screens.

Available as an option for the Graduate is an additional 5 Mb removable-media disk or 320K floppy disk drive. *(List Price: Basic model $3,450; with 320K Floppy Backup $3,995; with 5 Mb removable cartridge $5,350)*

Unidata Systems Inc.
Newington Pk.
Portsmouth, NH 03801
(603) 436-1100

CIRCLE 778 ON READER SERVICE CARD



The Graduate, Unidata Systems Inc.

Communications Adapter and Cable

A communications adapter designed for use with Pathway communications software, allowing the users to link their systems to SNA and BSC type IBM mainframe systems. The Adapter plugs into an available slot in the user's system and can support line speeds up to 19.2K baud.

The Adapter is connected to a user's modem or modem eliminator via Pathway's shielded cable with 25-pin "D" shell male-type connector. The cable is approximately ten feet in length. *(List Price: Adapter $295; Cable $40)*

Pathway Design, Inc.
177 Worchester St.
Wellesley, MA 02181
(617) 237-7722

CIRCLE 787 ON READER SERVICE CARD

Sysgen II-10 and II-20

Two Winchester hard disk drives with streaming tape backup. The drives provide formatted storage of 10 megabytes (Sysgen II-10) or 20 megabytes (Sysgen II-20). Both drives are equipped with a streaming tape cassette backup which can operate at rates up to 2.5 me-

gabytes per minute.

The hard disk systems can be configured in up to ten logical volumes (can be made to appear to a user's system as floppy drives C: through L:) under PC-DOS. Under the CP/M-86 operating system, the drives can be configured in up to 14 logical drives (floppy drives C: through P:). Number and size of volumes are selectable by the user.

Utilities included with the Sysgen II systems include: *PRESERVE*, which saves and restores data on volumes equivalent to disk volumes in an image fashion; and *FILESAVE*, which saves and restores data as individual files or sets of files.

Both the II-10 and II-20 include direct memory access operation, parity checking, and error checking codes. *(List Price: II-10 $2,995; II-20 $3,795)*

Sysgen, Inc.
47853 Warm Springs Blvd.
Fremont, CA 94539
(415) 490-6770
Telex: 49 90843

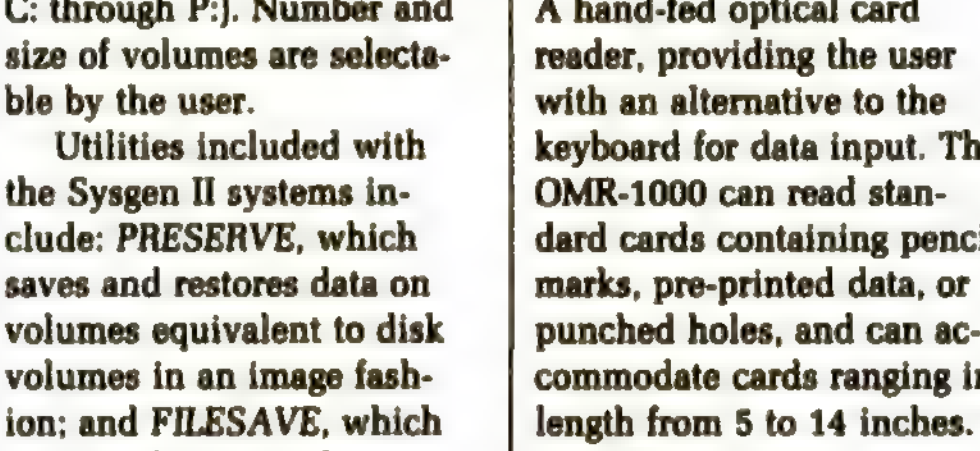
CIRCLE 786 ON READER SERVICE CARD

OMR-1000

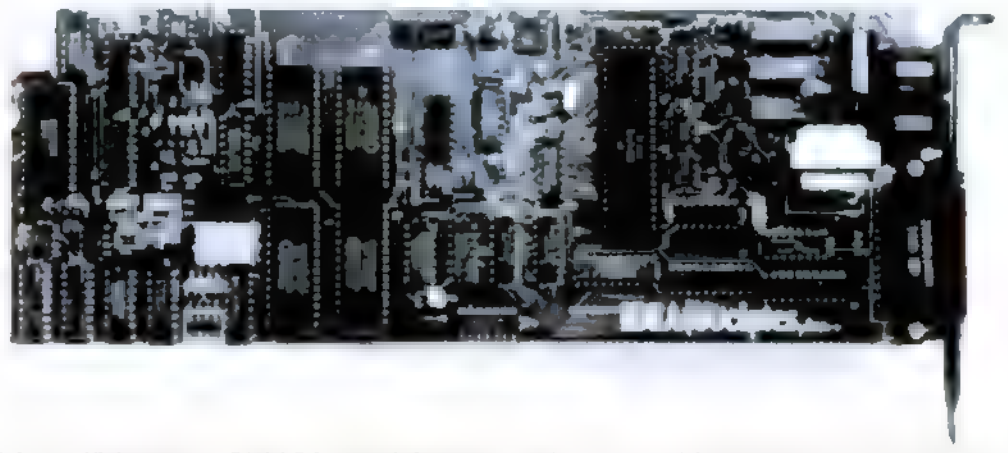
A hand-fed optical card reader, providing the user with an alternative to the keyboard for data input. The OMR-1000 can read standard cards containing pencil marks, pre-printed data, or punched holes, and can accommodate cards ranging in length from 5 to 14 inches. *(List Price: $1,095)*

Chatsworth Data Corp.
20710 Lassen St.
Chatsworth, CA 91311
(213) 341-9200

CIRCLE 780 ON READER SERVICE CARD



OMR-1000 Card Reader, Chatsworth Data Corp.



IDEAComm 1200, IDEAssociates, Inc.

IDEAComm 1200

A plug-in board offering a 300/1200 baud integral modem incorporating the functions of an in-board asynchronous card. The board contains an RS-232 interface that can be used as a serial port, and an additional plug for a telephone jack. Operating speed can be selected by user's software or automatically by the board.

Included software allows menu-driven selection of the board's communication, auto-dial, and auto-logon procedures. Help screens and prompts are included to assist the user in operating the board. *(List Price: $545)*

IDEAssociates, Inc.
7 Oak Park Dr.
Bedford, MA 01730
(617) 275-4430
Telex: 94 8245

CIRCLE 771 ON READER SERVICE CARD

Daisywheel Printer

A daisywheel printer with both word processing and graphics print modes, the Juki Model 6100 printer utilizes an IBM Selectric II ribbon and provides 10, 12, and 15 pitch and proportional spacing. The Juki employs a drop-in, 100-character daisywheel and has a bidirectional printing speed of up to 18 characters per second. The standard platen is 13 inches, and a bi-directional tractor feed is available as an option.

Internal buffer capability is 2K standard, with optional expansion to 8K. The printer includes a Centronics parallel interface, with serial RS-232 interface available as an option. *(List Price: $699)*

Vitek
930-G Boardwalk Ave.
San Marcos, CA 92069
(619) 744-8305

CIRCLE 783 ON READER SERVICE CARD

New On The Market

SOFTWARE

PC-PLOT

A graphics terminal emulating program, permitting a user to link to an RS-232 local network or modem for access to mainframe computer graphics programs such as *DISSPLA* and *TELL-A-GRAF*, *SAS Graph*, Textronix *PLOT-10*, as well as dial-up services such as Chemical Abstracts' CAS-ONLINE and similar graphics databases.

PC-PLOT is available in three versions. *PC-PLOT-I* offers virtual emulation of the Tektronix Model 4010 graphics terminal. *PC-PLOT-II* contains the basic program plus extended features allowing local printer control for ASCII listings, saving picture files to diskette, scaling of images after they have been saved, printing graphics images on an IBM printer (with PC-DOS 2.0) or Hewlett Packard plotter, and a serial communications debug mode for locating control characters imbedded in picture or text files.

PC-PLOT-II+ is a special version of the above program, designed for use with the Plantronics/Frederick Electronics ColorPlus adapter. This version also recognizes the color set and line draw commands of the Tektronix 4027 color graphics terminal. *(List Price: PC-PLOT-I $40; PC-PLOT-II & II+ $75)*

Requires: 64K, one disk drive, PC-DOS 1.1 or 2.0, async communications adapter, color/graphics card.

MicroPlot Systems
1897 Red Fern Dr.
Columbus, OH 43229
(614) 882-4786

CIRCLE 763 ON READER SERVICE CARD

FABS/PC

An 8086/8088 assembly language subroutine designed to provide rapid access to very large data files (up to 65K records, depending upon the size of the key). Variable length keys and duplicate keys are supported. Multiple primary keys can be maintained in a single tree providing primary access to data files on more than one key. ASCII keys can be specified (up to 100 bytes). Integer keys (0 to 65535) can be specified to occupy only 2 bytes in the tree. Multi-level sequencing is supported.

FABS/PC (Fast Access B-Tree Structure for the IBM PC) maintains data record keys in a key-sequential, multi-path, balanced tree structure. The subroutine's commands include: *Create, Open, Close, Search, Generic Search, Search Next, Search Previous, Search First, Search Last, Insert, Delete, Replace, Get Number of Data Records, Get Number of Open Deletes, Get Number of Primary Keys, Get Maximum Key Length, Get Next Record Number, Build File,* and *Write Map File*. The *Search Next* and *Search Previous* commands provide sequential access to data file.

The subroutine occupies 14.6K bytes of memory, and can be incorporated into existing programs. Included with the package is *NAMADD*, a name and address file in BASIC; demonstration and test programs; and a manual for implementation of the subroutine with IBM BASIC Interpreter. *(List Price: $150)*

Requires: 64K, one disk drive, PC-DOS, any DOS-compatible programming language.

Computer Control Systems, Inc.
298 21st Terr. S.E.
Largo, FL 33541
(813) 586-1886

CIRCLE 765 ON READER SERVICE CARD

DISPATCH

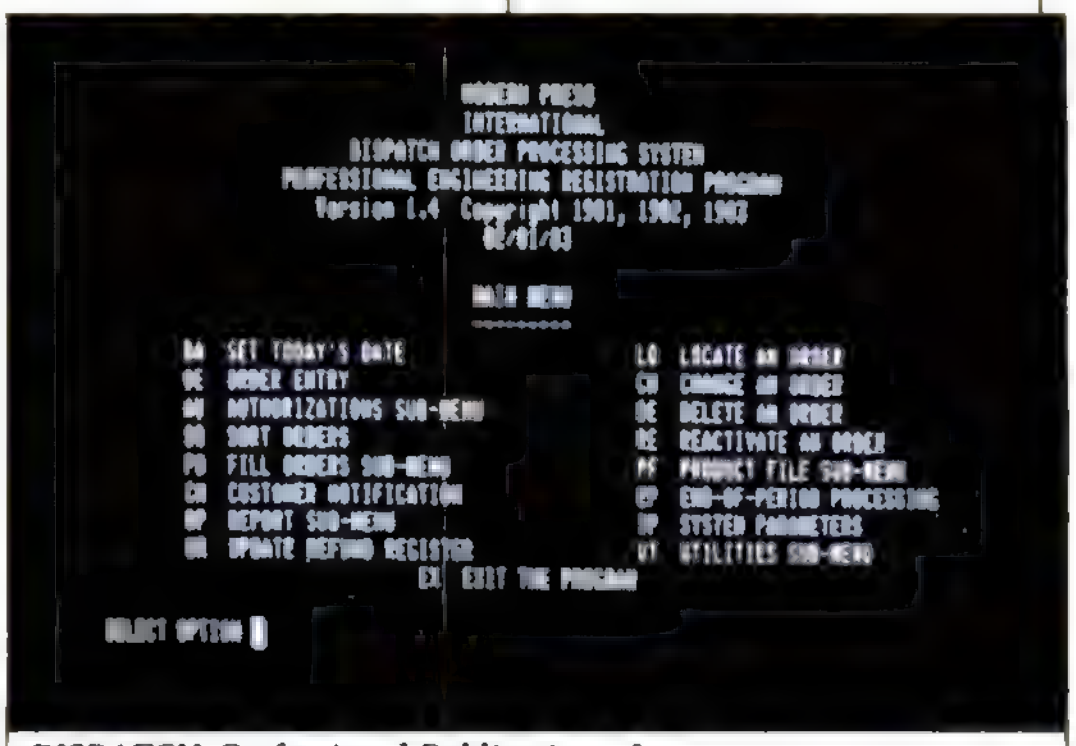
A mail order fulfillment program, utilizing a perforated multipurpose form which incorporates two mailing labels, a packing list showing product and financial information summary, a VISA/MasterCard sales draft, and a refund check or credit memo.

The program can maintain inventory records, supports on-line customer service, and produces marketing reports about source codes, back orders, and inventory. Back orders are updated automatically. The system also contains mailing list and accounting functions. (List Price: $2,495)

Requires: 128K, two disk drives, PC-DOS, monitor.

Professional Publications, Inc.
P.O. Box 199
San Carlos, CA 94070
(415) 593-9119

CIRCLE 726 ON READER SERVICE CARD



DISPATCH, Professional Publications, Inc.

Financial Horizons

A menu and function key driven program that analyzes and illustrates available options to terminating or retiring participants of profit sharing or pension plans. The program selects the best tax option for a lump sum immediate payout, and compares it to tax deferral methods such as IRA Rollover or a Terminal Funding Deferred Annuity, using present value analysis of the investment options available to the plan participant.

Output includes tax form input, comparisons of IRA Rollover versus 10-year averaging (with or without capital gain), and a detailed comparison of various investment alternatives such as single premium whole life contracts.

The program allows financial planners, attorneys, accountants, and trust officers to use it in two ways. One use is in developing "what if" comparisons for planning. The other manner is in generating a formal 12-page report for presentations, illustrating 25 year future projections. The software package includes six forms for data gathering and operator input. *(List Price: $550)*

Requires: 64K, one 320K disk drive, PC-DOS.

Horizons Computer
117 N. First, #107
Ann Arbor, MI 48104
(313) 761-3155

CIRCLE 754 ON READER SERVICE CARD



Organization Map, Pacesetter Software

Organization Map

A human resources management and productivity improvement program. *Organization Map* can be used by managers in the making of organization charts, in assisting manpower/succession and career path planning, in monitoring and controlling compensation costs, and as an aid in corporate reorganizations.

The program consists of two major components. The first, *Human Resources Decision Support System*, provides a complete description of an organization's structure, including layers of management, spans of control, and staffing levels. The system also provides the user with a human resource information system, tracking a variety of key facts on each employee as well as the characteristics of the overall workforce.

The second component, *Organization Analysis and Productivity Improvement Support System*, presents the user with a detailed view of the work activities taking place within the organization, where these activities take place, and their costs. *(List Price: $6,500; demo disk $35)*

Requires: 128K, two disk drives, PC-DOS 1.1 or 2.0, graphics monitor, color/graphics card, graphics printer or plotter.

Pacesetter Software
P.O. Box 5270
Princeton, NJ 08540
(609) 737-8351

CIRCLE 768 ON READER SERVICE CARD

BASIC Development System (BDS)

An integrated set of software tools for programming in BASIC. *BDS* attaches itself to the BASIC Interpreter, allowing the user to immediately access the software's features.

BASIC Development System's features include: *Single Step Trace*, a pause before software executes the next line of a program, requiring keyboard input before software continues execution. The line number is placed in the corner of the screen and does not interfere with program displays.

Cross-Reference provides a sorted list of every BASIC keyword, numeric and string constant, line number, and variable name used in the program and shows where each item is referenced.

Super Renum allows the programmer to renumber, relocate, or duplicate any block of program lines.

Variable Dump lists all program variables along with their current values.

Compress reduces the program's size to a minimum, leaving space for variables and string data and increasing the program's execution speed.

Uncompress expands the compressed program to make it more readable. *(List Price: $79)*

Requires: 64K, one disk drive, PC-DOS, BASIC Interpreter.

SofTool Systems
8972 E. Hampden Ave., #179
Denver, CO 80231
(303) 793-0145

CIRCLE 756 ON READER SERVICE CARD

New On The Market

Business Planning Tool (BPT)

A financial budgeting and forecasting tool that can also be used to generate complex templates for spreadsheet programs such as *VisiCalc*, *MultiPlan*, and *1-2-3*. With the *Business Planning Tool*, a user is not required to learn programming commands or special symbols. All formatting is automatic. An account is defined by positioning the cursor at the desired location and typing in an account name. Account type is then selected and numeric data entered via a "fill-in-the-blank" format. Account type is further defined by its position in the worksheet.

The *Business Planning Tool* also incorporates a twelve-month "time window" that presents a display of possibilities or an analysis of facts. To evaluate future effects of existing trends, the user may move the time window forward. The income statement and balance sheet are automatically updated according to the assumptions contained in each account description.

Another feature of *BPT* is its "Graph" screen, used to display a horizontal bar graph of an account. All data or any individual component (i.e. constants, interrelations, or base/trend and seasonal variations) of an account can be displayed or edited. Editing of the graph is through the arrow keys, used to manually extend or shrink a bar on the graph. The newly shaped bar then becomes input for the program.

Output is in the form of a report directly from *BPT*, or the program can generate a template complete with all formulae that mathematically describe the assumptions entered, for use with a spreadsheet program. *(List Price: $195)*

Requires: 128K, one disk drive, PC-DOS.

Sofstar, Inc.
13935 U.S. Hwy. #1
Juno Beach, FL 33408
(305) 627-5511

CIRCLE 755 ON READER SERVICE CARD

Scientific Software File System

A menu-driven database management program. The file format is user-customizable with up to 15 fields. Standard data editing capabilities are supported, and utilities include sort; multiple key search with substrings; global search; and basic arithmetic functions, allowing the sum of any field or the sum of mathematical operation on any two fields to be calculated.

Printouts include tables and mailing labels. *(List Price: $59.95)*

Requires: 64K, one disk drive, PC-DOS, monochrome display, BASICA.

Scientific Software
2 Sequoia Tree Ln.
Invine, CA 92715
(714) 857-8376

CIRCLE 725 ON READER SERVICE CARD

visuALL

A program creating windows on the display screen listing functions and commands for PC-DOS and a number of applications programs. The user, utilizing either a digital mouse or the cursor control keys on the keyboard, points to the desired command or function to activate it.

The *visuALL* program contains a window library for a number of applications programs, including the *IBM Personal Editor*, *WordStar*, and *Lotus 1-2-3*. It is task-oriented and user-modifiable, allowing it to be adapted to any application, creating consistent interfaces to all applications. *(List Price: $299; with mouse $495)*

Requires: 64K, one disk drive, PC-DOS 1.1 or 2.0, monitor.

Trillian Computer Corp.
P.O. Box 481
Los Gatos, CA 95031
(408) 374-5001

CIRCLE 742 ON READER SERVICE CARD



visuALL, Trillian Computer Corp.

Digital Research C

A full-featured implementation of the C programming language. Digital Research C provides a machine code compiler with error warning and reporting facility; the compiler's command line option switches accommodate direct control over aspects of the compilation process, providing the programmer with access to compiler-generated listings and interlistings. Other features include multiple memory model and chaining support, programming and debugging aids, single and double precision arithmetic, I/O redirection, plus full compatibility with the UNIX Version 7 C language standard defined by Kernighan and Ritchie.

Digital Research C can support the IBM 8087 Math Co-processor, and the run time library includes a set of double precision floating point functions. *(List Price $600)*

Requires: 128K, one disk drive, CP/M-86 or PC-DOS.

Digital Research
P.O. Box 579
Pacific Grove, CA 93950
(408) 649-5500
TWX: 910-360-5001

CIRCLE 762 ON READER SERVICE CARD

Inventory Management System Version 2

A new release of the Inventory Management System, offering complete inventory control, bills of materials and sales and purchase orders processing facilities. The program allows multiple locations, variable-length part numbers, automatic markups and price calculations, weighted average and standard costs, four price levels, user-definable reports, plus multi-company and multi-user capabilities.

Reports generated include master parts listing; departmental summaries; transaction, journal and purchasing variance; sales analysis; projected margins; and reorder, overstock, on-order and detail reports. The software can also print purchase orders, price lists, sales orders, invoices, bin labels, price tags, and physical inventory sheets. *(List Price: $1,095)*

Requires: 64K, one disk drive, PC-DOS.

CYMA Corp.
2160 E. Brown Rd.
Mesa, Az 85203
(602) 835-8880

CIRCLE 738 ON READER SERVICE CARD

KEYTOOLS

A package of programming utilities and tools for working in Advanced Basic under PC-DOS 1.1. *KEYTOOLS* includes the following: *PICASSO*, a multi-faceted screenmaker, capable of producing a variety of special graphic effects for text on screen; *EMERSON*, a formatted data entry subroutine, providing insert and delete edit functions, keyboard character restrictions, and allowing the user to customized fields for specific patterns of input; *SOCRATES*, a utility for building on-line "help" screens; and



Inventory Management System, CYMA Corp.

New On The Market

YOUNGMAN, a collection of "one-liners"—brief Basic routines that perform functions common to many programs.

The package is supplied on two double-sided diskettes, and includes a manual and reference card. *(List Price: $40)*

Requires: 64K, two 320K drives, PC-DOS 1.1, color or monochrome display.

KEY-1 Computer Systems
178 Spring St.
Newport, RI 02840
(401) 849-4562

CIRCLE 744 ON READER SERVICE CARD

ZURAN

A game program wherein the player's mission is to rescue survivors from damaged ZURAN spaceships, simultaneously defending against sudden attack from ECLON ships, outposts, and mines. The game creates a galaxy of nine quadrants through which the player moves a ship using the cursor control keys.

ZURAN makes use of defensive shields, hyperspace, energy refueling outposts, and long range scanning to detect enemy activity. The ten highest scores are preserved on the game diskette. *(List Price: $32.50)*

Requires: 64K, one disk drive, PC-DOS, color or monochrome display, color/graphics adapter.

ZEE Programming
P.O. Box 340142
Boca Raton, FL 33434
(305) 487-2172

CIRCLE 734 ON READER SERVICE CARD

smarTelex

A communications program, available in three seperate versions, that can link a user's system to International Telex (50 baud); Western Union's AUTOSAFE (providing message store and forward services) and Domestic Telex systems; and to Western Union's *Easylink* system, providing electronics mailbox, message store and forward, and a connection to other communications networks such as TWX.

The program allows the user to include other programs to the main menu. It can be used with any word processor program creating ASCII files.

smarTelex options include *Correspondent Directory*, providing a listing of Telex numbers, answerbacks, as well as name and address information. *(List Price: $449.95)*

Requires: All versions: 64K, two disk drives, PC-DOS, async communications port; Telex versions: F1-F2 Modem; *Easylink* version: Hayes Smartmodem.

Cappcomm Software, Inc.
One World Trade Cntr., #1043
New York, NY 10048
(212) 938-5702

CIRCLE 752 ON READER SERVICE CARD

PLOTCALL Graphics System

A graphics program allowing novice users to create charts and drawings annotated with text or special symbols. The program permits the user to access a dot matrix printer as if it were a plotter, without requiring a graphics card or additional hardware.

Plots can be generated by any programming language or from a digitizer. The software interprets commands placed by the user in data files. *(List Price: $149)*

Requires: 128K, one disk drive, PC-DOS, dot matrix printer.

Golden Software
P.O. Box 281
Golden, CO 80402
(303) 379-1021

CIRCLE 746 ON READER SERVICE CARD

TranscriptStar

A school transcript program that can record up to 1,000 student transcripts. Full instructions are displayed on the screen throughout the use of the program. *(List Price: $195)*

Requires: 64K, two disk drives, PC-DOS, monitor, printer.

DEC Computing
609 Oakleaf Dr.
Garett, IN 46738

CIRCLE 750 ON READER SERVICE CARD

PC Tutor 2.0

An interactive tutorial program for learning PC-DOS (MS-DOS) commands. The program covers PC-DOS version 2.0 enhancements such as Directory Structure, Batch Commands, Filters, Pipes, and Redirection, along with new commands.

The program is supplied on a plain English diskette and instruction manual. *(List Price: $59.95)*

Requires: 64K, one 320K disk drive, PC-DOS.

Comprehensive Software
2316 Artesia Blvd., #B
Redondo Beach, CA 90278
(213) 318-2561

CIRCLE 712 ON READER SERVICE CARD

The Bond Bidder

A program for municipal bond underwriting which can calculate True Interest Costs (TIC), Net Interest Costs (NIC), spread, and other information for serial and term issues. Features include the ability to change couponing, re-offering levels, bid premiums, or discounts. An incorporated optimizing capability allows the user to calculate optimum spreads per offering. *(List Price: $3,500)*

Requires: 64K, two disk drives, PC-DOS, monitor, printer.

Piedmont Software Co.
5200 Park Rd., #119
Charlotte, NC 28209
(704) 527-0117

CIRCLE 745 ON READER SERVICE CARD

STYX

A game program in which a player ventures into uncharted territory to stake a claim against the bewitching, swirling *STYX*, who have laid seige against the player. The player's aim is to advance into the playing field and corner off an area. To win each round, the player must capture at least 80% of the playing field.

The *STYX* guardians that travel the edge of the field have an electric barrier capable of destroying a player's marker on contact. If any part of the *STYX* touches the player's line before the area has been completely marked off as captured, the marker is also destroyed and the area lost.

The game allows use of joystick controllers or keyboard, records ten best scores, and includes a pause control and sound on/off. *(List Price: $39.95)*
Requires: 64K, one disk drive, color monitor, color/graphics adapter.
Windmill Software Inc.
2209 Leominster Dr.
Burlington, ONT.
Canada, L7P 3W8
(416) 336-3353

CIRCLE 717 ON READER SERVICE CARD

SmartKey II

A background utility program that allows a user to customize a keyboard to reflect the needs of software. All keys, including special function keys, may be redefined at will to become software commands or commonly used words, phrases, or boilerplate text.

Definitions may be changed at any time, even while another program is in operation. Definitions can be saved to a disk file.

Additional features of *SmartKey II* include instantaneous installation of special function keys; an expanded buffer able to handle up to 3,750 definitions at one time; a text compiler that can reduce entire text files to a single keystroke; and a built-in editor for complex reorganization of key definitions.

The program is compatible with most applications software, including *WordStar* and dBASE II. *(List Price: $89)*
Requires: 64K, one disk drive, PC-DOS or CP/M-86.
Heritage Software
2130 S. Vermont Ave.
Los Angeles, CA 90007
(213) 737-7252

CIRCLE 749 ON READER SERVICE CARD

PRESS 'N PLOT

A color graphics screen capture and print facility for users' systems equipped with PRISM printers. The program allows a user to capture an image, print it, save it, rotate it 90 degrees left or right, intensify colors, have it printed anywhere on a page, change color ribbon selections, invert black/white portions of images, control printer ports, control paper movement from the keyboard, and print screens of text. The program is invoked using a Shift-PrtScr command. *(List Price: $149)*
Requires: 96K, one disk drive, PC-DOS 1.1 or 2.0, color monitor, color/graphics card, PRISM printer with Color Option and Dot Plot Graphics Option.
American Programmers Guild, Ltd.
55 Mill Plain 17-5
Danbury, CT 06810
(800) 828-8088
(203) 794-0396

CIRCLE 723 ON READER SERVICE CARD

REAL ESTATE TOOLS I

A software package consisting of 45 menu-driven analysis routines for mortgages, leases (level and uneven payment), construction loans, and grouped and variable cash flows together with their respective amortization schedules. Analyses include Internal Rate of Return, Net Present Value, Financial Management Rate of Return, price to pay, points, yield, and others, computed in double precision arithmetic. Cash flows of up to 12 digits can be handled by the software.

REAL ESTATE TOOLS I is written in BASIC, and the package includes manual and two program diskettes. *(List Price: $299)*
Requires: 128K, two 320K disk drives, PC-DOS.
Annsohn Software, Inc.
2801 N. Surrey Dr.
Carrollton, TX 75006
(214) 446-4340

CIRCLE 761 ON READER SERVICE CARD

AMP-PC

An assets management program allowing securities transactions to be recorded under tax-lot (FIFO, LIFO, High Cost, Low Cost) and average accounting methods. *AMP-PC* has provisions for sector analysis, portfolio performance measurement, and for modeling and forecasting. Prices may be changed in real-time, immediately affecting all produced reports.

The program can produce over 20 reports, including operational and client oriented trade blotters, holdings and forecast evaluations, realized and potential gain and loss reports, and performance measurement on absolute, comparative, and strategic bases. *(List Price: $1,000)*
Requires: 256K, 10 MB Hard Disk, PC-DOS 2.0.
Securities Information Services, Ltd.
23 E. 10th St.
New York, NY 10003
(212) 460-5053

CIRCLE 748 ON READER SERVICE CARD

New On The Market

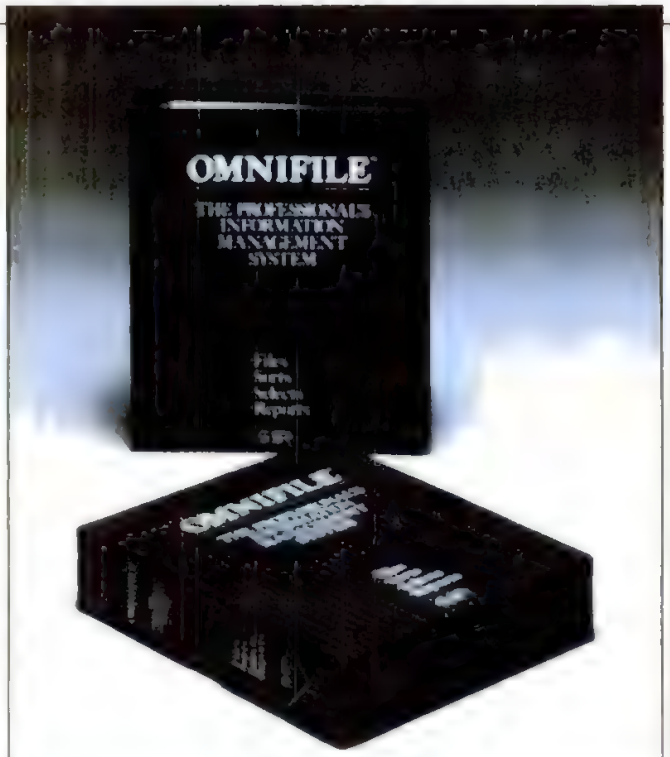
OMNIFILE

A database management system with report-writing capabilities. *OMNIFILE* reports include up to four sort levels, with totals, subtotals, counts and averages for each level. Calculated fields and multiple conditions are also supported.

The program uses common English commands. A special "How to" section in the user's manual provides information on setting such business applications as case docketing for attorneys, client dossiers for insurance professionals, sales productivity reports for managers, appointment scheduling for doctors and dentists, and personnel files for business managers.

The report-writing capability of *OMNIFILE* includes the ability to select information to be included in a report from a list displayed on-screen. *(List Price: $425)*
Requires: 128K, two disk drives, PC-DOS.
S.S.R. Corp.
1600 Lyell Ave.
Rochester, NY 14606
(716) 254-3200

CIRCLE 766 ON READER SERVICE CARD



OMNIFILE, S.S.R. Corp.

VC-DOCUMENTOR

A utility program for *VisiCalc* files which uses the row and column headings of the spreadsheet's models to print in English the definition of each cell address. The program can list cells by row/address or vice versa, and allows the user to print all or selected parts of a model.

For example, what *VisiCalc* would list as >B3:+B1-B2 is instead listed by *VC-DOCUMENTOR* by the row and column headings defined by the user, such as "1983 Gross= +1983 Sales−1983 Cost." *VC-DOCUMENTOR* operates independent of the spreadsheet program, and can handle without limitation models of any size or complexity. *(List Price: $49.95)*
Requires: 64K, one disk drive, PC-DOS 1.0 or 1.1, files in *VisiCalc* format.
Desktop Solutions, Inc.
P.O. Box 35659
Houston, TX 77235
(713) 723-6170

CIRCLE 743 ON READER SERVICE CARD

STATMAP

A demographic map-producing program which can accept data from user's files, dBASE II files, or from census data tract files. *STATMAP* provides an interactive database from which demographic data is drawn to create maps. Once generated, maps may be stored for later retrieval or for organization into a presentation through video display or hard copy printout.

User-addressable options available with *STATMAP* include a palette of up to 16 colors; definition of plotter "hatching" patterns; legend layout and content; titles; as well as a "clip and zoom" option, permitting detailed mapping of select portions of a displayed map.

The user may also generate a line printer report of data used to create a map, thus providing tabular as well as graphic output. *(List Price: $2,500)*
Requires: 128K, two disk drives, PC-DOS 1.1, color monitor, color/graphics board, serial interface, plotter.
GANESA Group International, Inc.
1495 Chain Bridge Rd.
McLean, VA 22101
(703) 442-0442

CIRCLE 721 ON READER SERVICE CARD



PAPERWORK, *Harris Microcomputers, Inc.*

PAPERWORK

A word processing program with capabilities including a line/screen editor and a mailing list address database. The program's editor works in two modes, "line" and "pseudo-screen." The "line" mode automatically assigns a reference number to each line of text, allowing global searches and replacement, text line movement, and line insertions, without needing to position cursor within the lines. Line commands include Add, Adjust, Copy, Delete, Insert, Locate, Move, and Replace.

The "pseudo-screen" mode allows changes to text to be made on screen through cursor movements made by the user. Screen capabilities include rapid cursor movement within a line, floating left-hand margin mode, character insertions, and character-for-character exchanges.

The editor also allows dynamic tab and margin setting, auto wrap-around at the right margin, boldface, underlines, 132-character lines with embedded text commands allowing headings, subheadings, line spacing, page ejection, etc., to be made as the document is being printed.

The mailing list database feature of *PAPERWORK* allows the user to merge name and address information into letters automatically. Each entry in the database consists of a mailing address, three dates, four phone numbers, a search key, a reference number, a user-defined category number, a letter greeting line, letter merge information, and a variable length note field. Search and retrieval routines allow the user to select data using any of the following criterion: a string match within the address; a category number list; a reference number range; a search key list; a relational operation list based on any or all stored dates; a zip code list; or a string match within the user-defined note field. The user may define up to 62 categories into which the address may be classified.

An update command allows simplified database maintenance, and a purge command allows selected addresses to be deleted from the database easily. Enter and change commands allow individual addresses to be modified or added as desired. *(List Price: $69.95)*
Requires: 128K, one 320K disk drive, PC-DOS, Basic Compiler Run Time Module, monitor, printer.
Harris Microcomputers, Inc.
2560 N. 560 E.
Provo, UT 84604
(801) 373-1605

CIRCLE 735 ON READER SERVICE CARD

ICC INTERCOM 100

A program permitting a user's system to emulate a Burroughs MT983/TD830 terminal. The program will simultaneously support up to six addresses—four addresses for concurrent operator dialogues or for bidirectional data transfers, and one for background printing. The sixth address is reserved for future upgrades.

Features of the *ICC INTERCOM 100* program include an on-line disk file transfer utility, data communication line monitor mode, and data transfer rates from 50 to 9600 baud using the IBM asynchronous communications adapter or equivalent. *(List Price: $99)*
Requires: 64K, one disk drive, PC-DOS, monitor, asynch. communications adapter.
Intercomputer
Communications Corp.
3195 Linwood, #2A
Cinncinati, OH 45208
(513) 321-3199

CIRCLE 737 ON READER SERVICE CARD

Basic Accounting System

A General Ledger program consisting of 30 separately compiled modules yielding a balance sheet, income statement, and statement of owners' equity. The program is written in compiled BASIC, and gives the user a choice of closing by month, quarter, or year. Up to 300 separate accounts are allowed in the program's Chart of Accounts. The program allows 750 journal entries in each accounting period, or 1500 account references if more than two ac-

New On The Market

counts appear per entry. Each journal entry is assigned a serial number within the current year to facilitate auditing.

Financial reports are customized with a personal, family or company name appearing on the heading of the printouts. Each print-out is semi-structured, with the variance resulting from the number and names of user-assigned accounts. In addition to the three principal financial reports, summaries of individual account activity and current balance are on call, as well as special callouts of all current accounts receivable and payable. Complete general journal and general ledger listings are printed at time of closing.

A utility program for data file status and maintenance is present, as is a program for depreciation schedules and three utilities for printing, tabbing, and appending text files built with the ED-LIN editor.

Password protection is built in to the program. User inputs are edited to prevent unwanted crashing. *(List Price: $119)*
Requires: 128K, two disk drives, PC-DOS 1.1, monitor, printer.
Fox Custom Systems
P.O. Box 161
Hendersonville, TN 37075
(615) 822-6266

CIRCLE 722 ON READER SERVICE CARD

Farm Ledger and Hog Management Programs

An accounting program designed for farmers, *Farm Ledger* allows users to maintain records of all cash, check, note, and account transactions. The program allows the user to set up accounts and expense categories using names instead of numbers. The *Hog Management Package* is a farrow-to-finish pork production recordkeeping program. The program can monitor and analyze central production factors, pinpointing high producing livestock and best-alternative management practices. The program can keep track of individual litters through finishing, or weight gain and feed conversion data by pens. *(List Price: Farm Ledger $250; Hog Management $300)*
Requires: Both programs: 64K, one disk drive, PC-DOS.
Harvest Computer Systems
102 S. Harrison
Alexandria, IN 46001
(317) 724-9527

CIRCLE 760 ON READER SERVICE CARD

MAX, The Production Manager

A program for planning and controlling inventory, production, and purchasing for small companies or divisions of large companies. The initial release of the software includes a set of six integrated modules that provide Bill of Materials Maintenance, Inventory Control, Master Scheduling, Material Requirements Planning, Shop Floor Control, and Purchasing Control. Planned future releases include modules for accounting, order entry, capacity planning, and management peformance reporting capabilities. *(List Price: Complete System $15,995; Individual Modules $4,995-$6,995)*
Requires: 320K, one disk drive, 10 MB Hard Disk, PC-DOS 2.0, monitor, printer.
Micro MRP, Inc.
1065 E. Hillsdale Blvd.
Foster City, CA 94404
(415) 345-6000

CIRCLE 759 ON READER SERVICE CARD

Material Optimization & Selection

A program to assist in selecting manufacturing materials, allowing the user to choose the most economical options. The program works for rectangular plates and sheets, in steel, aluminum, copper, brass, and other metals.

The user enters required size, quantity, and all available sizes in stock for a given thickness. The program makes the most economical selection, with a minimum of scrap. *(List Price: $95)*
Requires: 64K, one disk drive, PC-DOS, monitor.
Unik Associates
12545 W. Burleigh
Brookfield, WI 53005
(414) 782-5030

CIRCLE 617 ON READER SERVICE CARD

Formatted File Manager

A database management program. The user interacts with the program through electronic forms that identify the function to be performed as well as the data that must be entered. Users may also set up their own forms for interfacing with their own programs.

A form may be generated for accessing commercial databases; when used in this manner, data may be accessed sequentially, by an index or a record number. Forms may be 80 columns by 23 lines, or 40 X 23 if the color/graphics card is installed in the user's system. Data fields in a form may be numeric or non-numeric, and up to one line in length. As many as 175 fields may be defined per form. Field attributes are user-programmable, and access to a form may be password restricted.

Utilities are provided for sorting, changing index fields or file structure, appending data files, creating a subset of a data file, as well as for global editing. *(List Price: Basic system $225; Report/Sort Option $70)*
Requires: 128K, one disk drive, PC-DOS.
Exim Services of N.A.
P.O. Box 5417
Clinton, NJ 08809

CIRCLE 718 ON READER SERVICE CARD

ACCESSORIES

Pagemate Easel

A book holder and typing easel constructed of non-magnetic plastic, designed to accommodate almost any size book, programming manual, or loose pages. Accessories available include extenders for hard back and thick publications, which allow the user to hold pages in place on any hardcover book or thick manual up to 13 ¾ inches high. Amber "Line-A-Timers" are also available, transparent plastic line locators that adhere to any page and permit easy movement and place location. *(List Price: Basic unit $19.95; with accessories $27.95)*

Pagemate, Inc.
8166 E. 44th St.
Tulsa, OK 74145
(918) 627-7440

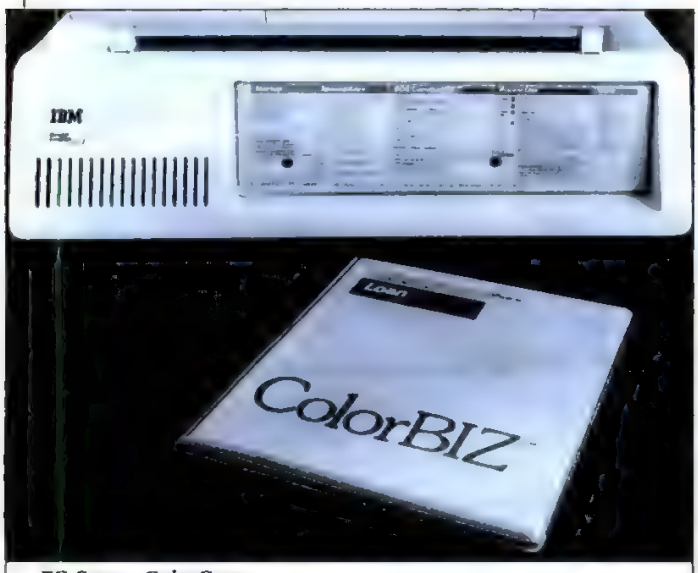
CIRCLE 711 ON READER SERVICE CARD

PC-Saver

A dust cover that fits into the disk drive or hard disk opening of the systems unit. The device contains a printed card showing a summary of operating commands. *(List Price: $9.95)*

ColorCorp
208 N. Berkshire
Bloomfield Hills, MI 48013
(800) 521-0793
(313) 335-2255

CIRCLE 710 ON READER SERVICE CARD



PC-Saver, ColorCorp

Computer Covers

A line of fitted dust covers made of a washable cotton/polyester blend. Available colors include grey with navy piping, or beige with wine piping. The covers are designed to fit over an entire system (systems unit, monitor, and keyboard), when placed in the standard configuration. Separate unit covers are also available.

For an additional charge, the manufacturer will silkscreen a company's logo onto the covers, and for orders over 500 pieces, custom colors are available. *(List Price: $10-$30, depending upon model)*

CJ Computer Covers
3338 O St. N.W., #204
Washington, D.C. 20007
(202) 338-7308

CIRCLE 706 ON READER SERVICE CARD

Diskstand

A diskette temporary storage device, allowing an operator to stand diskettes on desk between uses, or diskette envelopes when the diskettes themselves are in use. When not in use, the unit can be stored either in a desk or in a two or three hole binder. Diskstand comes in five colors: white, sand, grey, brown, and black; and sizes for 5¼-inch and 8-inch floppy diskettes. *(List Price: $12.95)*

DAMONICS
P.O. Box 132
Corning, NY 14830
(607) 524-6328

CIRCLE 709 ON READER SERVICE CARD



Sound Training, Information Systems Resources

Sound Training

Audio cassette based instruction in the use of major software programs, such as *WordStar* and *MailMerge*, *MULTIPLAN*, *Lotus 1-2-3*, PC-DOS, dBASE II, *SuperCalc*, and *Personal Pearl*. *(List Price: $69.95 each)*

Information System Resources, Inc.
1444 Balsam St.
St. Paul, MN 55122
(612) 452-7913

CIRCLE 708 ON READER SERVICE CARD

Continuous Forms for Personal Computers

A new line of personal computer continuous form kits. The line consists of the following packages:

Kit # MF201- 3½ x 15/16 inch Labels. Contains 4000 labels, 1000 each in pink, blue, yellow, and white.

Kit # MF205- 500

New On The Market

sheets of 8½ x 11 inch stationery with clean-edge perforations. Also, 200 continuous #10 size envelopes.

Kit # MF207- Continuous Index Card Kit. Four varieties of colored index cards, 3 x 5 inch detached. 500 cards each in yellow, blue, green, and red.

Kit # MF209- Large index Card Kits. Same as MF207, but in 4 x 6 inch size when detached.

Kit # MF211- Continuous Rolodex-Style Cards- 3 x 5 inch Rolodex-type cards, 500 each in yellow, blue, green, and red. *(List Price: MF 201 $25; MF 205 $25; MF 207 $30; MF209 $49.50; MF211 $39.50)*
Micro Format
1271 W. Dundee Rd.
Buffalo Grove, IL 60090
(312) 537-2426

CIRCLE 705 ON READER SERVICE CARD

Accent Computer Furniture

A line of computer furniture available in a range of veneer finishes, including oak, teak, rosewood, and walnut. Worktables are available in 36 inch and 48 inch models, and feature detachable monitor and peripheral shelves. A matching printer stand with locking front casters is also available. *(List Price: Worktables: 36-inch $300; 48-inch $340; Printer Stand: $300)*
Accent
7587 Clyo Rd.
Dayton, OH 45459

CIRCLE 707 ON READER SERVICE CARD

PUBLICATIONS

Microprocessor Support Chips

A practical one-volume compilation, *Microprocessor Support Chips: Theory, Design, and Applications*, by T.J. Byers, presents data on more than 100 interface chips used to support micro-processors in circuitry. Providing schematics of chips in operating environments, the book describes each chip, gives specifications and parameters, shows pin connections and logic diagrams, and describes applications circuits.

Details and information for each chip are provided on two facing pages. The book covers six major categories of chip functions: telecommunications, power supply, interface, control, video, and analog/digital, digital/analog conversion. It includes cross-references by part number and circuit function, allowing desired data to be located readily. *(224 pgs., $38)*
McGraw-Hill Book Co.
Professional & General Books
1221 Ave. of the Americas
New York, NY 10020
(212) 997-3493

CIRCLE 703 ON READER SERVICE CARD

Computer Evaluation Program

An audio cassette program outlining an introduction to the capabilities and capacities of microcomputer systems and software. The program is entitled: "Five Keys to Greater Success and Profits With Your First Computer." Included with the two-cassette package is the Business Evaluation Questionnaire, a series of multiple choice questions which the user answers and forwards to the program's publishers for evaluation. Answers are evaluated and objective purchase recommendations are sent to the user, based upon the information the user has submitted. *(List Price: $14.95)*
Success Systems Unlimited
124 Paul Dr., #105
San Rafael, CA 94903
(415) 492-0408

CIRCLE 698 ON READER SERVICE CARD

Computer Furniture. Accent



Hardware/Software Retailers Directory

A market reference guide to retail computer and software stores. *The 1983 Directory of Computer & Software Retailers* offers listings of 2,625 computer store companies operating 12,500 stores, as well as 700 computer and software distributors. Listings show the names, addresses and telephone numbers of companies; their product lines and brands; services provided; store locations and distribution centers; sales volumes; type of ownership; the names of executives, and the names of buyers for the companies. *(700 pgs., $350)*
Chain Store Guide
425 Park Ave.
New York, NY 10022
(212) 371-9400

CIRCLE 697 ON READER SERVICE CARD

Directory of Mailing List Programs

A directory reviewing 36 mailing list programs that can run on the user's system. Two charts compare over 90 criteria, under such categories as Basic Information, System Environment, Input (creating files and adding, changing, or deleting data), Processing, and Output (label printing). Included is a list of the software firms and their addresses. *(List Price: $6.50)*
System 33
P.O. Box 25395
Los Angeles, CA 90025
(213) 826-5840

CIRCLE 699 ON READER SERVICE CARD

COLLEGIATE MICROCOMPUTER

A quarterly journal for the exchange of ideas on the role and uses of the microcomputer in all subjects and areas of college and university life. Material appearing includes the uses of hardware and software in curricula, descriptions of courses using personal computers as tools, results of research and experiments using personal computers, student projects, suggestions and tips on incorporating personal computers into the classroom, etc. *(Subscription Rates: $28 per year U.S.; $36 per year outside U.S.)*
COLLEGIATE MICROCOMPUTER
Rose-Hulman Institute of Technology
Terre Haute, IN 47803
(812) 877-1511

CIRCLE 702 ON READER SERVICE CARD

PC/XT Product Directory

A directory of over 3000 products, including hardware, software, accessories, and books. The directory contains an alphabetical listing of each vendor with address, a description of each product offered, its requirements, and price.

In addition to the product listings, the directory contains charts and tables comparing both hardware and software in a number of categories. The directory's index lists entries by product category, product name, and product type. A glossary of terms and acronyms has also been included.

The directory is available in either printed or diskette form. *(List Price: Either form $11; both forms together $20)*
Computer Information Collective
P.O. Box 10998 #363
Austin, TX 78766

CIRCLE 696 ON READER SERVICE CARD



dBASE II Techniques Manual, Compudex Corp.

dBASE II Techniques Manual

A manual providing techniques and command files for effective operation of dBASE II software. *The Compudex Beginning and Advanced dBASE II Techniques Manual* features complete command files, a journal entry sub-system, and instructional techniques for saving disk and directory space, speeding up data processing, using ASCII characters, using the CP/M editor, and increasing overall efficiency.

The 96-page manual lists methods for combining command and form files and using dBASE II instead of such functions as the CP/M PIP. Command files include instructions for establishing a notepad system, days of week, metric conversion tables, and other programs, offered along with the journal entry sub-system. ($25)
Compudex Corp.
P.O. Box 147-S
Natick, MA 01760
(617) 235-5152

CIRCLE 704 ON READER SERVICE CARD

New On The Market

Interfacing to Microprocessors

A guide to the design, arrangement, and programming of microcomputer interfaces. This book, by J.C. Cluley, examines the development and testing of systems, as opposed to isolated circuits, and includes design examples and solutions to problems. Program examples illustrate how data transfer can be effected, how the state of external devices can be tested, and how they can be controlled.

The guide covers such topics as basic microprocessor architecture as it relates to interfacing techniques, the principles of data transfer, I/O packages, buses, transducers and signal conversion techniques, and system testing and development. Discussion is given to such subjects as flag testing, digital inputs, analog sensors, nonlinear operations, output and motor drive circuits, logic state analyzers, graphical displays, direct memory access, and in-circuit emulators.

A chapter is devoted to 16-bit microprocessors, including the Intel 8086, the Motorola 68000, and the Zilog Z8000. *(157 pgs.; $24.50)*
McGraw-Hill Book Co.
Professional & General Books
1221 Ave. of the Americas
New York, NY 10020
(212) 997-3493

CIRCLE 709 ON READER SERVICE CARD

Press Release of the Month

Dada Data Corporation today announced the introduction of its new Widgit/666, an advanced new office automation product that runs on electricity.

With a state-of-the-art design that stresses full functionality and versatility, the new Widgit/666 solves the problem of the bureaucrat who needs to exhaust his capital expenditures budget by the end of the fiscal quarter.

"Buy this product and I'll be your friend," said George Metesky, Dada Data's marketing vice-president, who insists on being quoted in press releases. "At Dada Data, we understand your problems. After all, we're bureaucrats, just like you."

Fully Compatible: The new Widgit/666 is fully compatible with the rest of the Dada Data product line. The color is the same, the finish is the same, the logo is the same. Seen alongside other Dada Data equipment in a data processing shop, no one will question it.

User Friendly: The new Widgit is easy to use. There is no puzzling keyboard and no intimidating dials, buttons, light panels, or controls of any kind. A simple yet stylish chromium on/off switch (a component operating with binary logic) provides a streamlined user interface to the system.

When used with Dada Data's GonzoNet local-network architecture, the Widgit can be fully ignored from any of the network's member processors. The Widgit can be activated, deactivated, installed, removed, or pushed out of an airplane without affecting the operation of the network as a whole—and vice versa.

Software Support: The Widgit/666 may be unique in the world of data processing in that it requires no software of any kind. A full range of documentation is, nevertheless, provided with the unit, including a thick notebook of highly technical yet ultimately meaningless performance data, which should provide the end user with everything he needs to justify his purchase.

Ergonomic Design: The Widgit/666 features "ergonomics," a marketing buzzword that implies that a system is designed to be used by human beings. The use of human-factors engineering in the Widgit's design is in stark contrast to most equipment produced by the DP industry, which is apparently intended for dogs, rats, salmon, and kangaroos.

Communications Capabilities: The user need not bother with standard communications protocols, such as asynch, bisynch, RS-232, X.25, SNA, or TTY, since the unit has no communications capabilities of any kind.

Though the Widgit/666 is designed for the electronic office, it will not interfere with normal business conversations, since it produces none of the distracting noises associated with computer equipment. Additionally, the top of the unit offers a flat, firm surface on which a standard telephone may be positioned; with this peripheral device, the Widgit/666 system will support voice communications to nearly any place on earth.

Simple to Operate: After plugging in the Widgit/666, the operator merely has to flip the little chromium switch on the right-hand side of the unit to fully boot up the system (as an option, the Widgit may be delivered with the switch installed on the left). A small, red indicator lamp will then come on, radiating a cheery glow into the otherwise bleak computer room. If the Widgit is not being used for communications support (as described above), the system operator may place a coffee pot on top of the unit and attach it to the two-prong port on the interface panel at the rear of the chassis.

Other uses of the versatile Dada Data Widgit/666 are only limited by the user's imagination—though in the data processing profession, this may be a grim statement.

Dada Data Corporation develops, manufactures, markets, and supports whatever sells. For details, call up and find someone willing to talk to you. *List Price:* Widgit/666 $599, left-handed model $619, coffee pot $32.75, coffee $5/bag.

—*Lamont Wood*

TOTAL RECALL™

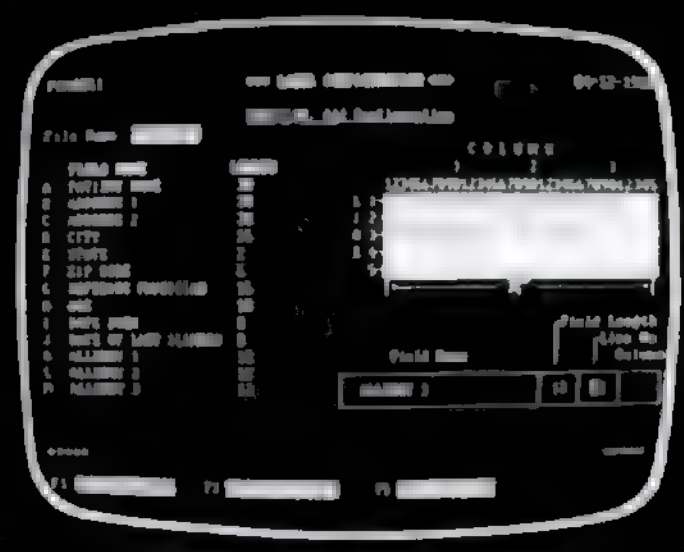
THE DATA BASE FOR SOPHISTICATED LIST MANAGEMENT APPLICATIONS

TOTAL RECALL - power and sophistication in list management for both the novice user (everything's in 'English') and the computer whiz (extremely flexible).

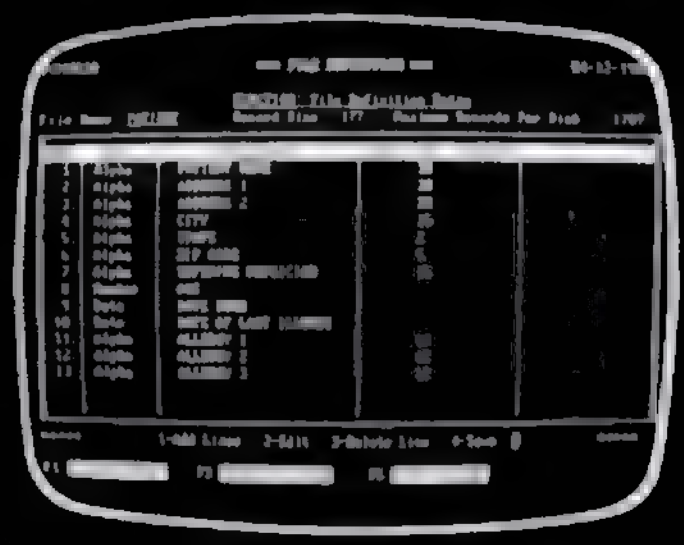
Simple to understand, fast to learn, and exceptionally easy to use.

You can have this fast and highly efficient program running in less than one hour.

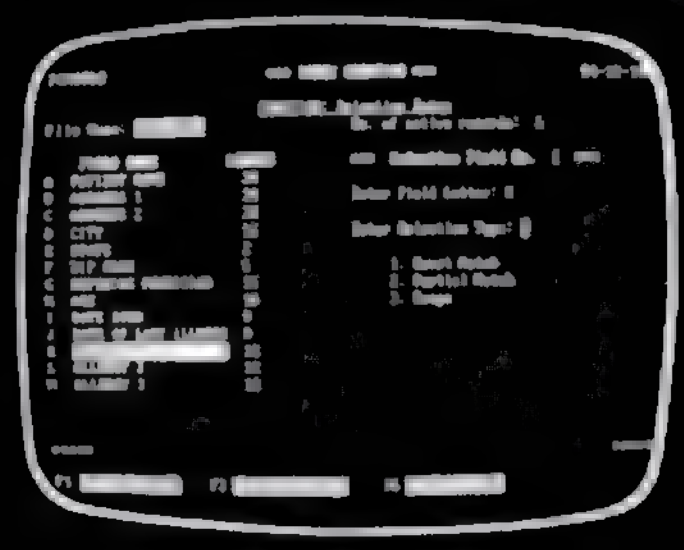
- *For customer lists, patient lists, keeping track of prospects (last time called, number of children, etc.), organizing mailing lists to take advantage of Post Office discounts, and many other uses.*
- *Easy to Understand and Use - IBM® style manual filled with examples and complete 'English' language instructions.*
- *Complete 'For the Novice' Tutorial*
- *Flexible Structure - with TOTAL RECALL you define your own entry format with up to 15 fields, 35 characters per field, plus numeric and date fields.*
- *Sophisticated List Management - You can extract entries from your list using up to 15 different parameters then sort your list up to 3 levels deep.*
- *Completely Menu Driven - no special codes to learn, no 'computerese' to wade through.*
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Northfield, IL 60093
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- R650 Interface (1 to 31 L-50s) $1425.00

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COMPUTER COZIES?



Custom-Made, Quilted Computer Covers

Anti-static, machine washable. Offered in 6 colors: grey, cream, chocolate, navy, burgundy, or rust. Any cover can be made-to-order — just send dimensions. Perfect Christmas gift — order one for your VCR or Betamax. System and Monitor (1 or 2 piece) and keyboard: $50/set. Narrow printer: $20. Wide printer: $24. Individual unit prices available. Specify system and printer model #. CA residents add 6.5% sales tax. Please allow 6-8 weeks for delivery. VISA/MC accepted.

COVERS A LOT
P.O. Box 369, La Honda, CA 94020 (415) 747-0352

PSYCHE SAYS IT ALL

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FINALLY A REALLY NEW MODERN ARTIFICIAL INTELLIGENCE PROGRAM. Written especially to capitalize on the speed and power of the IBM PC, PSYCHE will hold a delightfully real keyboard conversation with you on 60 subjects, including marriage, work and sex. PSYCHE's responses are so on target you will find yourself thinking of PSYCHE as an actual person.

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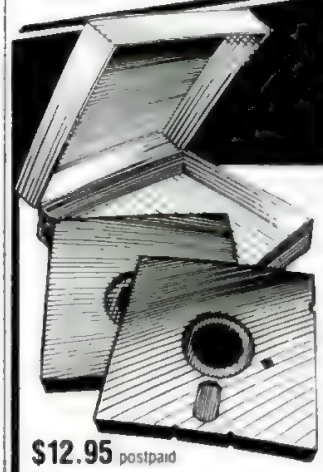
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MARK ZACHMANN

Learn how to grapple with GRAPHICS, handle mounds of memory, and quiet down a printer in this month's session with the PC Tutor.

PC Tutor



Graphic Jam

Q: Could you explain how the PC-DOS 2.0 GRAPHICS command works? The manual says that it can be used to print text-mode screens, but when I do that I get the same output I'd get if I simply used the PrtSc key without the GRAPHICS command. Also, I find that I don't get a good copy of the screen. For example, I made a double-line box, but when I printed the screen, it came out as a single-line box. Is the IBM printer not thoroughly compatible with the PC screen?

One last question. If I use BASIC to create a screen, how can I return to DOS to issue a GRAPHICS command without messing up the screen?

Michael Trombetta
Manhasset, New York

A: The first thing to keep in mind is that GRAPHICS is a program. Once you run it, by typing GRAPHICS, it loads itself into memory and stays there, despite the absence of any sign-on or informative message. Once loaded, GRAPHICS knows when you are in graphics mode and will dump the screen accordingly when you hold down the shift key and hit the PrtSc key.

This will work from within BASIC and most other languages. You don't need to exit to DOS: just hit the PrtSc key. If the machine is rebooted, you will need to reload GRAPHICS.

If you are in character mode, however, GRAPHICS just lies passive and lets the IBM's normal print screen function go to work. This is why characters you use from the upper 128 set display incorrectly. Most printers only print 96 characters, and there is no standard for the full set of 256 characters.

The Silent Type

Q: I want to use a thermal printer with my IBM PC, but my local computer store tells me they know of no such product.

I know that a thermal printer's output would not be letter-quality and that in time the printout would fade. Neither of these limitations matter to me; I simply want the peace and quiet. Can you suggest a solution?

Carl Diesen
Frederick, Maryland

A: I have not found a thermal printer (not a terminal) suitable for the PC. You might consider three other options for quiet printing, however.

First, you might try some of the newer dot-matrix printers. Both the Epson FX-80 and the Okidata 9X series run quite comfortably. When you run it in normal speed mode, the FX-80 can't be heard through apartment walls. The FX-80 also has a half-speed quiet mode, but this actually seems a bit noisier.

ONCE you run GRAPHICS, it loads itself into memory and stays there.

If the noise of even these new dot-matrix printers annoys you, try making a muffled box for your printer. Make it look like a very deep bookcase. Use strong pieces of ¾-inch wood, join them with screws and/or a sturdy wood glue, then line the box with a lint-free carpet fragment, such as a kitchen carpet, or a heavy material such as for drapes.

Remember to leave a slit in the box so the paper can be fed in. The box will act like a muted speaker, so point it at a non-reflective surface. In terms of sound

INK JET printers work by actually shooting ink at the paper.

reflection, the worst (most reflection) to best materials are glass, steel, tile, glazed brick, glossy paint, flat paint, wood, large oil paintings, furniture, and drapes.

Sometimes, pointing the printer and its box in the right direction will reduce noise adequately.

Another option is to purchase a noise shield. A number of letter-quality printers have plexiglas shields available that cut the noise down considerably. They work best with a sheet feeder or roll paper. A strong base is important to reduce transmitted vibration.

The most attractive option might be to purchase an ink-jet printer. There is at least one available now that produces excellent copy with essentially no noise, the Olivetti PR 2300 at a price of $560. It might sacrifice speed for silence, but you say that is no problem.

Ink jet printers work by actually shooting ink at the paper. Although early ink jets were plagued by drying ink and clumps (the same problems that attack fountain pens), later versions use some interesting approaches. The PR 2300 uses an electrostatic method with a solid ink.

Inline Assembly

Q: I find working with the Assemble (A) command in the PC-DOS 2.0 DEBUG a useful way to learn more about assembly language programming without going through the entire compile sequence using the macroassembler.

When using EDLIN, ASM, and LINK, I can express a segment override as follows:

```
MOV ES:[BX],AX
```

I find that the compile process converts this to the following when I look at the unassembled program in DEBUG:

```
SEG ES
MOV [BX],AX
```

My question is, how can I accomplish this using the inline assemble in DEBUG? It will not accept either of these formulations on input.

Elmer Schwittek
Atlantis, Florida

A: *Although the DEBUG software for PC-DOS versions 1.1 and 1.0 suffered horribly from incompatability between the assembler and the debugger, the PC-DOS 2.0 version is much improved. In general, it shows the same mnemonics as ASM has compiled.*

Apparently, the inline Assemble (A) command suffers a bit from that problem as well. My inline Unassemble (U) command actually shows

```
ES:
MOV [BX],AX
```

as a segment descriptior, so you need to enter ES:. (I wonder, though, if we have different versions of DEBUG? Mine has a time stamp of 3-08-83.)

Compiled Gibberish

Q: There are many times that I find a bug in the software that I would like to correct. PC-DOS will give me a listing of programs328 that are in BASICA, but when I request a listing of a program in any other language, I get gibberish. Is there some command or method that I can use to get a listing in the original language, or even in hexadecimal code?

IF YOU save a BASIC program, you normally get something unreadable by PC-DOS.

Harld Paz
West Covina, California

A: *Most programs that you might try to list are written in a compiled language, such as Pascal or compiled BASIC. As a result, the file contains object code in machine language, which consists of a string of numbers intelligible only to the 8088 processor, not a listing of the program.*

Note that if you save a BASIC program, you normally get something unreadable by PC-DOS. To get a listable version, use the ,A option by keying in something like SAVE "MYPROG",A. The file named

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MYPROG.BAS will contain the listing of your program. You can use a text editor to edit this program file, then reload it with BASIC at any time.

As for listing object code, the best approach is to use the DEBUG program. Try the following. First, put the PC-DOS disk in drive A. Then key in the following

FOR LISTING object code, the best approach is to use the DEBUG program.

in response to the PC-DOS and DEBUG prompts:

```
A>DEBUG DEBUG.COM
-U
```

You will see the DEBUG.COM program in a form as close to source code as you can get. What you'll see is assembly code, with actual numbers and addresses rather than the labels (variable names) that are normally used. If you want to see the program in HEX, key in the D100 command rather than U in response to the DEBUG prompt.

A Surfeit of Memory

Q: With a small fortune in software and hardware in my office and home, I still seem to be having difficulty.

First, I decided that 576K was not enough, so I repopulated the memory to 832K. Now my JFORMAT program, from Tall Tree Systems, cold boots with a screen full of multi-colored garbage. Tall Tree Systems told me my mistake is that I did not purchase its RAM cards. Tall Tree cards, I was told, do not have these problems. Can you tell me why?

Then I decided to purchase some QCS Winchester drives. After acquiring the hard disks, I found I couldn't install my most expensive, copy-protected software. Nor can I use the RAM manager, spooler, and Winchesters at the same time. Three lengthy letters to Lotus on how to install 1-2-3 on my Winchesters did not even elicit an acknowledgement, let alone an answer.

After reading about PC-DOS 2.0, I was first on the block to get a copy. The trouble is, the maker of the hard disks doesn't have any software to tie into PC-DOS 2.0's theoretical capability, and I don't know how to do it myself.

Ideally, I'd love to allocate blocks of RAM for both electronic disk operation and print spooling that are available while I use the hard disks. The PC-DOS 2.0 driver in the manual only uses 180K and I want more than this, but I don't know how to change the driver, or write several drivers of them with different amounts.

Raymond L. Watkins
Rye Brook, New York

A: First, your 832K of memory is causing trouble because it actually overlays the memory in the display adapters, which are located right at 704K and 736K. When JFORMAT runs, it apparently uses as much memory as it sees available for RAM disk. In your case, this will include some of the memory in your display adapter. When you display characters, parts of the electronic disk will be filled with garbage. That could be very dangerous.

This is caused by JFORMAT determining how much memory is in your system by reading all of the bytes in order until it finds out where memory stops. Since there is no demarcation between the end of your user RAM and the video display adapter RAM, you'll have troubles here. A simple fix would be to disable the last 192K of memory and restrict yourself to 640K, which should suffice for most purposes.

Tall Tree Systems gets around this problem with its cards by not having all of their memory accessible at one time.

THERE is no demarcation between the end of your user RAM and the video display adapter RAM.

Instead, they use a bank selection approach. Switching between banks causes different pieces of memory on the card to be available to the computer. In this way, you could have over 1 megabyte to use for RAM-disk.

The SemiDisk cards (made by SemiDisk Systems, Inc.) work even more strangely. They have none of the memory accessible; instead, the computer uses input/output (I/O) ports to address the on-card memory. This method takes up none of the address space used by programs and data.

To modify the PC-DOS 2.0 RAM-disk driver, you only need to change a few numbers to get the driver to have as much memory as you like. This will not solve the overlay problem, though.

If you feel like playing around with the device driver on page 14-27 of the DOS 2.0 manual, and have an IBM assembler, try changing the values of the BPB (starting at line 86) and the BOOT_REC (line 103) in tandem. One simple approach would be to have it act like a double-sided disk drive. See Figure 1 for the new BPB description.

```
; double sided diskette bios parameter block
BPB    EQU    $ dw     512      ;sector size
                 db     2        ;sectors/allocation unit
                 dw     1        ;number of reserved sectors
                 db     2        ;number of FATs
                 dw     112      ;number of directory entries
                 dw     720      ;total number of sectors
                 db     0FDh     ;media descriptor
                 dw     2        ;number of sectors occupied by FAT
```

You will also need to change line 248 from 2D00 hex to twice that, which is 5A00 hex. Also change line 269 to use a first FAT entry of OFDh.

```
248   MOV   AX,5A00h;reserve 360K bytes
269   MOV   DS:BYTE PTR SI[,0FDh} ;compatible with BPB
```

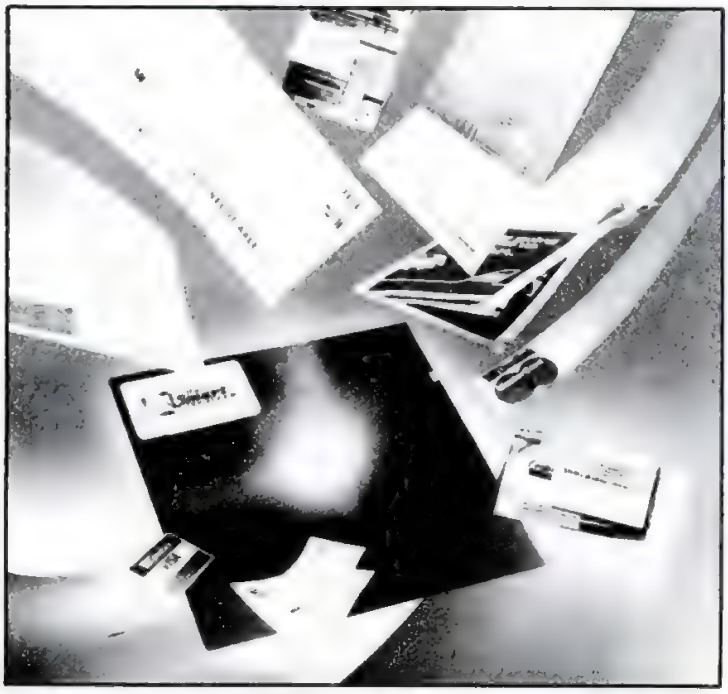
Figure 1: Modifications of BPB description to emulate a double-sided disk drive.

In Figure 1 the bios parameter block (BPB) describes the RAM-disk. By doubling the number of available sectors to 720, we tell DOS that the disk can store 360K bytes: 720 sectors with 512 bytes per sector. Using a different number of sectors would work equally as well.

The file allocation table has one entry (at 1.5 bytes each) per allocation unit. An allocation unit is the storage increment used for files. Thus, by doubling the allocation units from one sector to two sectors, two things happen. First, the smallest non-empty file now takes up 1024 bytes, rather than 512 bytes. Second, since there are twice as many sectors, but each allocation unit handles two sectors, the file allocation table (FAT) remains the same size (1.5 bytes per unit × 360 units = 540 bytes); this means two sectors are needed.

If we were to keep the allocation units at one sector, then the FAT would need to be 1080 bytes (1.5 bytes × 720 units) or

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ONE OF THE problems with PC-DOS 2.0 is that its delivery was much later than expected.

three sectors, but storage would be allocated more efficiently.

The change from 64 to 112 directory entries is made just to keep to the PC-DOS conventions. You can actually pick any number you like. This value sets the upper limit on the number of files in the root directory. Also, since each entry takes up 32 bytes, the more possible entries, the more wasted space.

Changing the media descriptor byte from FC to FD is also in keeping with the PC-DOS conventions. As far as I can tell, the media descriptor should never be used, except by the driver itself. Some PC-DOS 1.1 functions used this descriptor, but that practice is discouraged in PC-DOS 2.0, despite protestations to the contrary in the manual. For example, both 8-inch and 5-inch diskettes share the FD media descriptor byte.

The change made to line 248 alters the amount of room requested by the driver, in order to accommodate the additional storage required by a double-sided disk. (One paragraph is 16 bytes.)

The change at line 269 ensures that media descriptor bytes match. The media descriptor should be the first byte of the FAT; line 269 places the media descriptor there.

You might wish to try playing around with different values. Just make sure the FAT has enough room for all of the allocation units, and that you request enough storage on line 248.

Note that both the BPB and the boot record must be changed in tandem. Don't ask why the code doesn't read the BPB, rather than the value called BOOT_REC—I don't know. Also, don't ask why the driver code assumes that ES:BX, the pointer to the device request header, is unchanged between the device strategy call and the device interrupt call. This is clearly a mistake, even though it works in PC-DOS 2.0.

For a simpler approach to setting up 360K of storage, just have your CONFIG.SYS file contain two lines of DEVICE=RAMDISK.SYS or whatever you call the binary file. This will create two 180K RAM-disks for you.

You also wanted to know how to put 1-2-3 and other copy protected software on your hard disks. Unfortunately, copy protected truly means that you can not copy the software—you can forget about installing it on your hard disk. If you could do that, then you could just as easily install it on your neighbor's hard disk! It is unfortunate that manufacturers seem to be copy protecting more and more. Having seen the amount of illicit copying going on, I suppose I can't blame them, but it certainly makes life difficult for those of us who purchased the software.

As to using spooling and your Winchesters at the same time: you should be able to spool. If you are having trouble, then perhaps it is a hardware incompatability problem. Spoolers and Winchesters

THE IBM PC has a number of interrupt lines available—seven by one counting method.

both use interrupts. An interrupt is a signal on a dedicated line (or wire) that tells the computer that something has happened. For the spooler, a signal would indicate that your printer is ready for another character. For the Winchester, an interrupt is often used to indicate that the data transfer is finished, or the SEEK operation is done. If the printer port and the Winchester use the same interrupt lines, then you will have trouble.

The IBM PC has a number of interrupt lines available—seven by one counting method—and you should be able to convince the QCS hard disk to use a different line if that is the problem.

My guess is that it is more likely that this problem is linked to your RAM-disk problem; it is not a function of the Winchesters, but the amount of memory you

have. You might contact QCS to see if the manufacturer can supply a DOS 2.0 driver for its Winchester drive.

Partitioning memory should be a relatively simple task. Your RAM-disk program will not conflict with any other programs. If you can get a spooler that is done via device drivers, as is the RAM-disk, then that should clear up everything. You might want to check with the board's manufacturer.

One of the problems with PC-DOS 2.0 is that availability has been poor; its delivery was much later than expected. As a result, hardware manufacturers are struggling to catch up. Expect that most of these problems will be solved when PC-DOS 2.0 compatible Winchester and spooler drivers are available.

THERE is no automatic technique for retrieving accidentally erased files.

Permanent Loss

Q: You mentioned in Volume 1 Number 11 that an accidentally erased file is forever lost ("Unerasing Files," page 77). This is not true. You can recover a file in two steps.

First, use DEBUG to load the file directory and find the 32-byte file reference. Change the first byte back to the original file name character and save the file directory.

Next, find out the file size, and then load the FAT. *[Note: for an explanation of FAT, see my answer to "A Surfeit of Memory" this month.]* **Now, by starting with the FAT pointer in the 32 byte directory, you can move sequentially through the free sectors until the file is completely retrieved.**

Tibor N. Vari
Wayne, New Jersey

***A:** I include this somewhat technical question to make a point: There is no automatic technique for retrieving accidentally erased files. Despite suggestions to the contrary, these methods just do not work reliably.*

EVEN when you think you know a system inside-out, rereading the manual can let you discover system capabilities that you never knew existed.

Although you can guarantee that the sectors originally occupied by the file are now set as "unused," you cannot tell where those sectors are. They could be scattered throughout the diskette.

Changing the directory entry will retrieve the first allocation unit—512 bytes or 1024 bytes for single/double sided disks. Anything after that will be retrieved at random, although there's a probability you can find a string of sectors belonging to the file.

The only program I know of that reliably lets you retrieve a lost file is UnErase, one of Peter Norton's utilities. This program uses an interactive approach in which the user checks sectors that were marked "unused" one at a time to finally retrieve the complete file. Furthermore, there is no way to retrieve an accidentally erased program that's not in character format unless you know the original byte patterns of the program.

You can make a stab at retrieving a file by moving through the FAT to find unused sectors in order. This will work if the disk is not fragmented; this will be the case if the disk was recently formatted and is not full. Otherwise, forget it.

Better Input

A number of people wrote to inform me that there is a much simpler way to input a line containing commas than the method I suggested in Volume 2 Number 3 (see "Stringing Commas" on page 504). Their answer was to use the LINE INPUT statement. A typical program fragment might be:

```
10 LINE INPUT "Enter anything";
   anything$
20 PRINT anything$
30 END
```

Although readers' comments ranged from friendly to acerbic, I would like to quote one from Glenn Bleakney of Wilmington, Delaware:

Your blooper points up the need for something that all users of computer systems must do periodically: read the manuals. Even when you think you know a system inside-out, rereading the manual can let you discover system capabilities that you never knew existed.

Well put, Mr. Bleakney.

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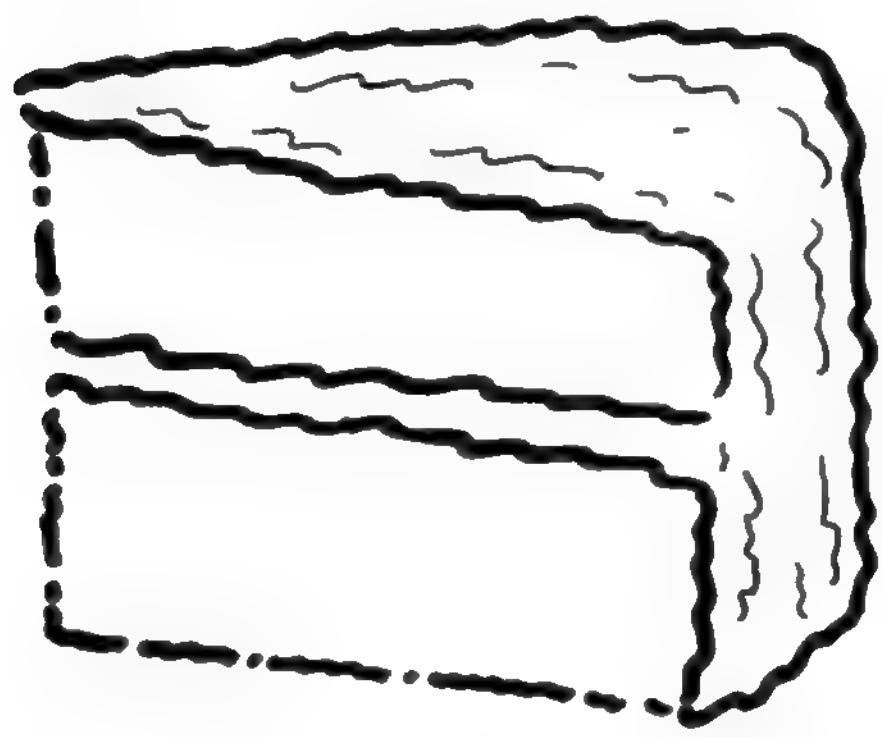
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CLUB NEWS/EDITED BY SUSAN HURLEY

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PC User Groups

This list provides the names and addresses of PC User Groups worldwide. You can check this list to locate other PC aficionados in your area.

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Birmingham, AL 35219
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Santa Maria, CA 93455
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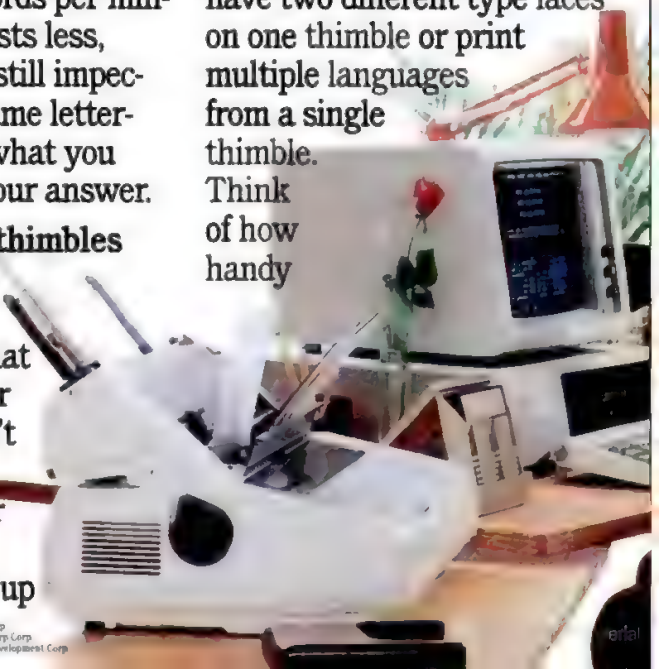
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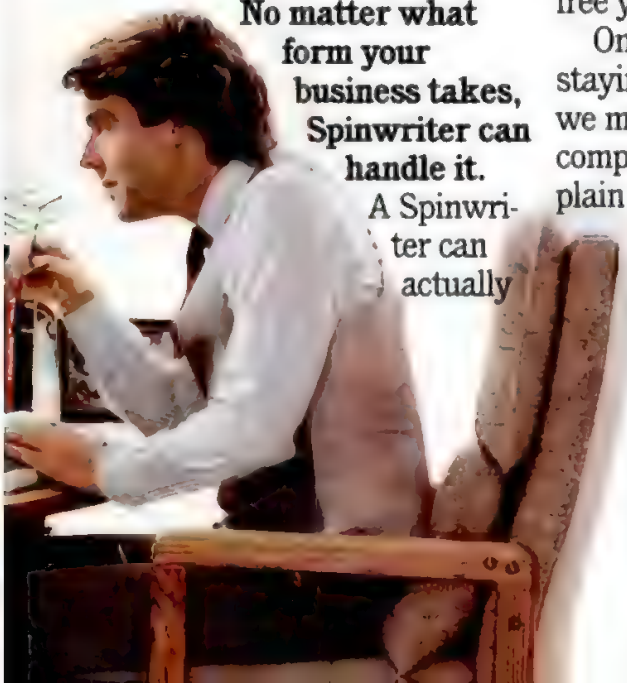
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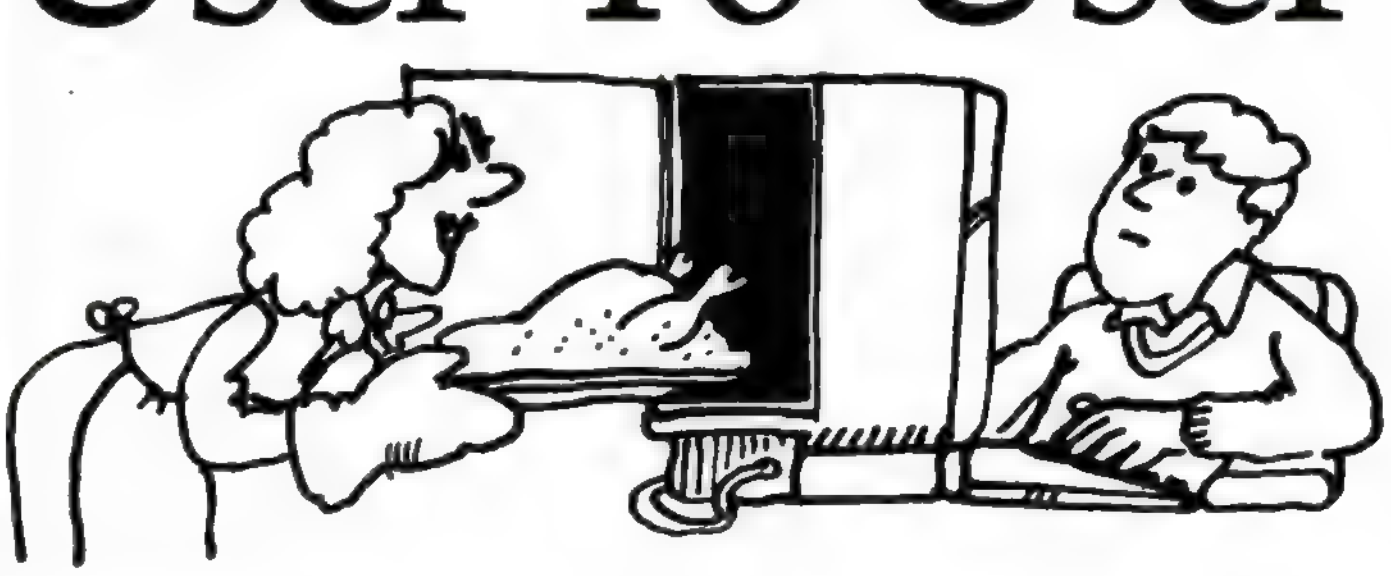
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EDITED BY BILL MACHRONE

PC readers help each other by passing along their tips and tales of tribulation.

User-To-User



Let Us Now Give Thanks . . .

The enclosed program (see Figure 1) is for dull people who like to show off their computers.

Most application programs are extremely boring to the uninitiated. A snazzy word processor program may be fascinating to the writer but is totally uninteresting to everyone else. The same goes for spreadsheets, accounting, and engineering programs. Playing games is about the only application that the average person can quickly relate to. And dull people don't have any games.

I wrote this program after being asked to help prepare a turkey for dinner. It originally was about five lines long, but after lunch I sort of got carried away as you can see.

The expanded version took about half an hour to write. This is a classic case of computer overkill. The average person might spend a total of 5 minutes during his entire life performing the same amount of work.

However, I have found that while absolutely no one is interested in my manufacturing labor distribution program or my casework cut listing and cost factoring program, when I demonstrate *TurkeyCalc* the crowd is fully appreciative every time.

And it isn't an idle waste of time. It does a job that most people need to have done every now and then.

Not knowing what else to do with it, I am sending it to you.

Carl W. Spencer
Riverside, California

Overdone is definitely the word for this one. Before someone tells us to get stuffed or, worse, gives us the bird, we have to say that we just didn't have the heart to kill this turkey.

Disagreement over DEBUG?

I have just finished reading "User-To-User" in the August 1983 issue of your magazine. To my amazement, you missed the point of "We Interrupt This Program. . . ." What you obviously do not realize is that functionally correct software products, similar to DEBUG, have been avail-

Figure 1: The TurkeyCalc program by Carl Spencer.

```
2 '  TurkeyCalc                                              4-27-83
3 '  Copyright (C) 1983 Carl W. Spencer
4
5 '  Saved as "TURKCALC"  [Figure cooking time for turkeys]
6
7    ON ERROR GOTO 2050
8
100 '  ********** VARIABLE NAMES **********
110
120 '    W.......Weight of the bird
130 '    X.......Cooking time (decimal)
140 '    Y.......Extra minutes (decimal)
150 '    Z.......Extra minutes (truncated)
160 '
1000 '  ********** TITLE SCREEN **********
1010
1020 CLS: KEY OFF: GOSUB 1730
1030
1040 '  ********** OPENING TUNE **********
1050
1060 PLAY "MB T180 O2 L8; GGGEF8.GG..G; O3; CCC; O2; B.AG..."
1070 PLAY "GFFFF.FEEEE.ED.DD.ED..G.."
1080
1090 '  ********** MAIN INPUT **********
1100
1110 CLS: LOCATE 1,5: COLOR 15: PRINT "TurkeyCalc";
1120 COLOR 7: PRINT TAB(41) "(C) Copyright 1983 Carl W. Spencer"
```

Figure 1 continues on next page.

Illustration by Frank Marciulano

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Figure 1 continued.

```
1130 FOR N=1 TO 80: PRINT CHR$(196);
1140 NEXT
1150 PRINT:PRINT:PRINT TAB(5) "This program calculates the proper cooking time f
or any turkey you may have."
1160 INPUT "    How much does your bird weigh (in pounds)";W
1170 IF W<16 THEN 1410
1180 IF W>=16 THEN 1220
1190
1200 '  ********** PROCESSING BIG BIRDS **********
1210
1220 HOW$="breast side down.": TEMP$="275"
1230 IF W>20 THEN 1240 ELSE 1350
1240 FOR N=2000 TO 4000 STEP 20:        'Wolf whistle
1250 SOUND N,.1
1260 NEXT
1270 FOR N=1 TO 150: NEXT
1280 FOR N=2000 TO 4000 STEP 40
1290 SOUND N,.1
1300 NEXT
1310 FOR N=4000 TO 2000 STEP -40
1320 SOUND N,.1
1330 NEXT
1340 COLOR 15: LOCATE 7,54: PRINT "What a bird'": COLOR 7
1350 X=(W$22)/60
1360 Y=(X-INT(X))$60
1370 Z=INT(Y): GOSUB 1480: GOTO 1600
1380
1390 '  ********** LITTLE BIRDS **********
1400
1410 HOW$="breast side up.": TEMP$="325": IF W<6 THEN LOCATE 9,5: COLOR 15: PRIN
T "Let the poor critter grow up'": COLOR 7: GOTO 1600
1420 X=1.5+W/4
1430 Y=(X-INT(X))$60
1440 Z=INT(Y)+1: GOSUB 1480: GOTO 1600
1450
1460 '  ********** PRINT ANSWER TO SCREEN **********
1470
1480 LOCATE 9,5: PRINT "Cook the bird for";
1490 COLOR 15: PRINT INT(X) "hours";
1500 COLOR 7: PRINT " and";
1510 COLOR 15: PRINT Z "minute(s), ";
1520 COLOR 7: PRINT HOW$
1530 PRINT: PRINT TAB(5) "Temperature: " TEMP$ CHR$(248)
1540 PRINT: PRINT TAB(5) "Note:  Cooking time is only an estimate.  The best way
 to know if your"
1550 PRINT TAB(12) "turkey is properly roasted is to have placed a meat thermome
ter"
1560 PRINT TAB(12) "in the thigh muscle.  It should register 185" CHR$(248) " wh
en the bird is done."
1570
1580 '  ********** CHECK ANOTHER TURKEY? **********
1590
1600 LOCATE 25,5: PRINT "Would you like to check out another turkey (y/n)?";
1610 LOCATE ,,1: M$=INPUT$(1)
1620 IF M$="Y" OR M$="y" THEN CLS: GOTO 1060
1630 IF M$="N" OR M$="n" THEN 1930
1640 GOTO 1600
1650
1660 '  ********** ERROR MESSAGE CLEARING SUBROUTINE **********
1670
1680 LOCATE 25,5: PRINT "
                        ";
1690 RETURN
1700
1710 '  ********** COPYRIGHT SCREEN SUBROUTINE **********
1720
1730 LOCATE 5,20: FOR N=1 TO 42: PRINT CHR$(196);
1740 NEXT
1750 LOCATE 10,20: FOR N=1 TO 42: PRINT CHR$(196);
1760 NEXT
1770 LOCATE 5,19: PRINT CHR$(218): LOCATE 5,62: PRINT CHR$(191): LOCATE 10,19: P
RINT CHR$(192): LOCATE 10,62: PRINT CHR$(217)
1780 FOR N=6 TO 9
1790   LOCATE N,1: PRINT TAB(19) CHR$(179) SPC(42) CHR$(179)
1800 NEXT
1810 LOCATE 6,33: PRINT "> TurkeyCalc <"
1820 PRINT
1830 LOCATE 8,38: PRINT "from"
1840 LOCATE 9,33: PRINT "Carl W. Spencer"
1850 LOCATE 12,26: PRINT "for the IBM Personal Computer"
1860 LOCATE 22,1: FOR N=1 TO 80: PRINT CHR$(196);
1870 NEXT
1880 PRINT SPC(23) "Copyright (C) 1983 Carl W. Spencer
1890 RETURN
1900
1910 '  ********** END PROGRAM **********    &
1920
1930 PLAY "MB T120 O2 L8; GGGGEFG.GG..G; O3; CCC; O2; B.AG..."
1940 PLAY "G; O3; C..C; O2; B..AG..EC..DE..GE..DC...."
1950 CLS: GOSUB 1720
1960 ' ending instructions
1970 LOCATE 15,15: PRINT "If session is finished, remove diskettes from drives."

1980 LOCATE 17,18: PRINT "When you are ready to run another program insert"
1990 PRINT SPC(11) "appropriate DOS System Diskette in Drive A and press ENTER";

2000 INPUT "",M$
2010 CLS: SYSTEM
2020
2030 '  ********** ERROR RECOVERY ROUTINES **********
2040
2050 IF ERR=73 THEN 2060 ELSE END
2060 CLS: LOCATE 25,5: BEEP: COLOR 15: PRINT "Please load BASICA before running
this program. [ENTER] to go to DOS.";
2070 M$=INPUT$(1): GOSUB 1680: COLOR 7: SYSTEM
2080
```

able for nearly every computer ever manufactured. A statement that "the PC is not designed to be a logic analyzer . . ." conveys your total ignorance of the fact that the developers (we all know who I mean) of IBM PC's DEBUG really blew it. I quote from the IBM PC Pascal manual, page 1-11, "IBM Personal Computer Pascal is more than a tool; it is a tool maker, designed for writing smart programs that make our computer easier to use and more accessible to people." The correlation may not be immediately obvious, but consider how many computer professionals use DEBUG. If the number of individual users is small, why did IBM provide a software development tool in their standard operating system? Or for that matter, why did they decide to provide a development tool with bugs and then pass the buck to a salesman uneducated in the state of the art?

To all those readers who could care less about development tools: You may have spent upwards of $500 on a piece of software that cannot be completely functionally tested.

Timothy S. Anderson
St. Michael, Minnesota

You may not believe it, but we really are in agreement on DEBUG. I have used enough similar programs on other computers to appreciate how they should work. IBM's (actually Microsoft's) lackadaisical attitude toward proper operation with the PC's interrupt structure is shameful. Even if it single-stepped perfectly, it still would be a poor choice against a logic analyzer for debugging real-time or interrupt-driven activities.

More dBASE II Color Mods

I have some comments on "dBrightness in dBase," ("User-To-User," PC, Volume 2 Number 2). There have been many references to using POKE 1047,n in the PC version of *dBASE II* to change the video attribute.

However, the byte at 1047 affects only the video attribute of characters displayed with the GET clause of the @ . . . SAY command. I desperately wanted to control the appearance of all characters on the screen. With a little snooping, I discovered that location 1062 controls the attribute of what appears from the prompting portion of the @ SAY command. For example:

```
POKE 1062,15
@ 5,2 SAY 'This should be
high intensity.'
```

Programmers are well advised to be wary of undocumented features. All my *dBASE II* programs use memory variables for the POKE addresses and attribute codes; if a new version of *dBASE II* has different locations, or if I want to change colors, only a few statements need to be updated.

I also wanted attribute control for the displays from the question (?), ACCEPT, and INPUT commands. These commands apparently write to the screen via standard operating system calls. With DOS 2.0, I use the ANSI.SYS screen control driver (see pages 13-2 and 13-8 in the DOS 2.0 manual). It is easy to issue escape sequences from *dBASE II* to set the "graphics rendition." See Figure 2 for an example.

This program enables you to make very attractive screens. But why not stick with the @ command? It seems that the @ SAY command would not correctly display some of my memory variables containing long strings of special characters for drawing boxes on the screen.

One undesirable consequence in using the ANSI escapes sequences to set the video attributes is this: When the user enters data in a GET field, the characters entered have the attribute set by the last escape sequence, not that set by POKE 1047. For example, most of my GET fields are highlighted and underscored with POKE 1047,9, so I also issue a ? Bright+Under

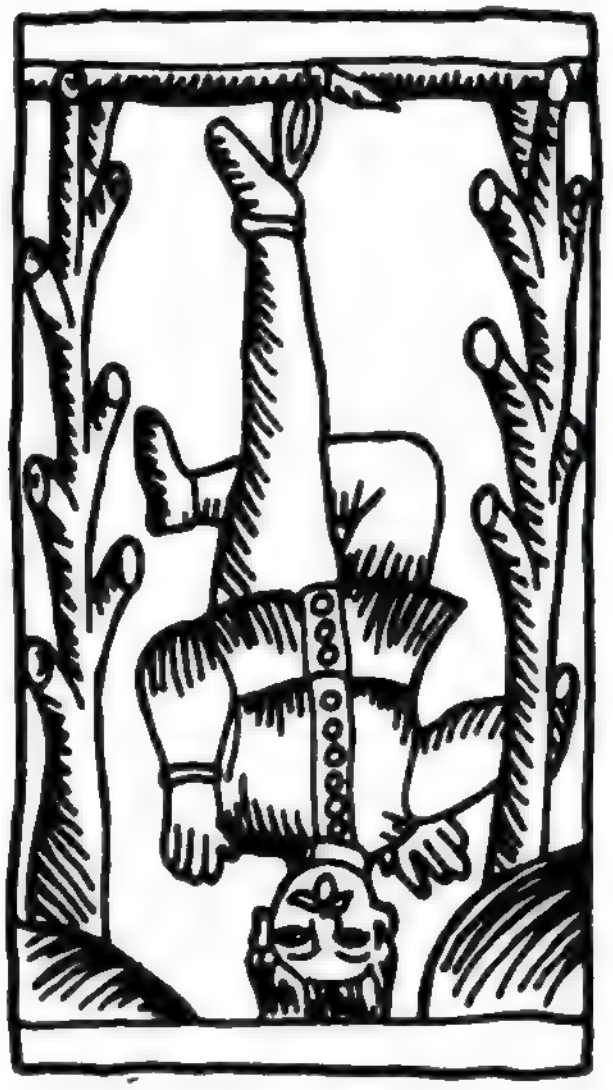
Figure 2: *Christopher Sacksteder's program enables you to make attractive screens in* dBase II.

```
* Assign string to set bright, normal, and underscored
*    characters:
*
STORE chr(27) + '[1m' TO Bright
STORE chr(27) + '[0m' TO Normal
STORE chr(27) + '[4m' TO Under
? 'This is normal '+Bright+'and this is highlighted.'
? Under+'This is underscored and highlighted.'
? Normal+Under+'This is underscored and normal intensity.'
? Normal+'This is normal text.'
```


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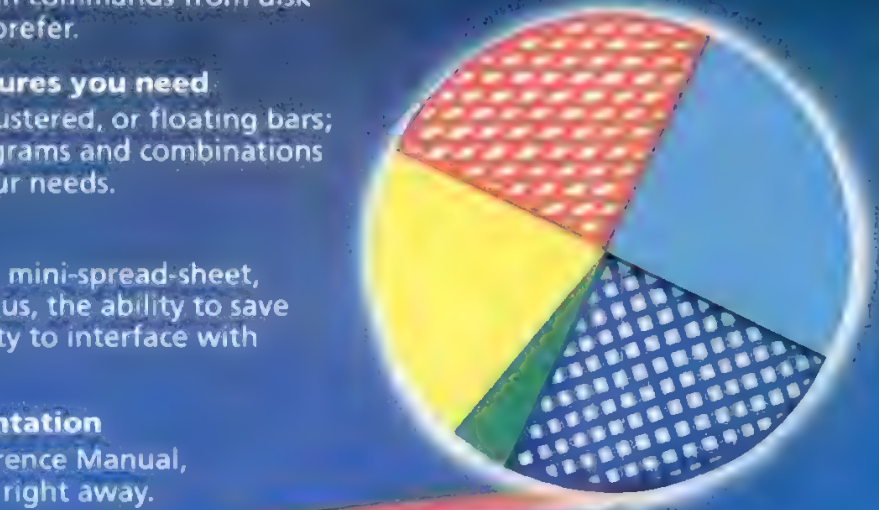
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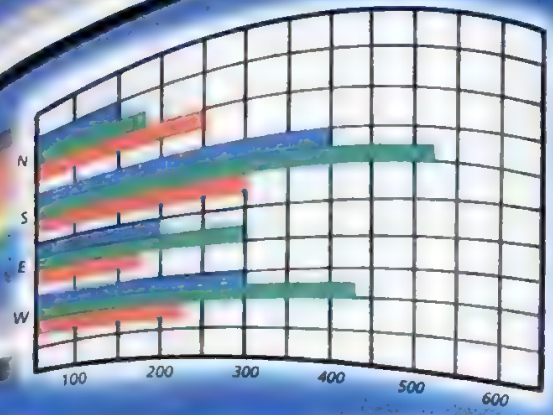
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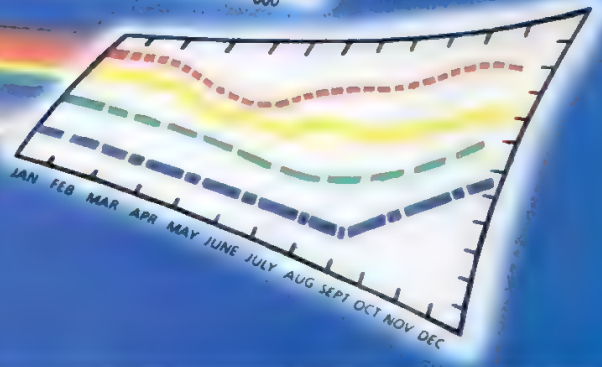
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before the READ (assuming the Bright and Under memory variables were previously set as shown above).

This may seem like a lot of trouble, but it greatly enhances the appearance of *dBASE II* screens, and this lazy programmer decided it was worth the few extra lines of code. I was wishing for a new version of *dBASE II* for the IBM PC that would make changing screen attributes easier, perhaps another keyword within the @ command and/or another SET option. However, a list of enhancements in version 2.4 has no mention of this kind of feature.

Christopher J. Sacksteder
State College, Pennsylvania

Chris' point on using variable names for poke addresses and attributes is well taken. Thanks for the illumination.

The Price is Right on DISK-CAT

DISK-CAT is a disk file cataloging program that was written for a PC users group in Houston to maintain the group's software library.

Its machine language code reads a disk directory, getting each file's name, creation date, and file size. Another routine in the program allows you to add a one- or two-word file classification and a longer file description. The file information is stored in a database that can be sorted, edited, and printed by *DISK-CAT*.

Another feature allows putting a file on each disk containing the information in the catalog—name, classification, description, etc.—for just the files on that disk.

DISK-CAT is available free of charge to any user group that sends a formatted disk and a postage-paid, self-addressed mailer to Nelson Ford, P.O. Box 61565, Houston, TX 77208.

Nelson Ford
Houston, Texas

We're always glad to pass the word on user group software sharing. Want this program for yourself? Join one of the user groups listed in PC's "Club News" dept.

Happier Returns

I'm responding to a question in "PC Tutor" (see "Unhappy Returns," PC Volume 2 Number 2) concerning the use of an NEC PC-8023 printer.

According to the manual for the PC-8023A-C dot-matrix printer, I changed the switch "SW1-7" from the factory's setting (open) to closed. This has provided totally satisfactory performance for all printer output—PrtSc included. No other DIP switches related to carriage returns or line feeds should be changed since this can affect proper operation. Hope this helps.

Steve Smith
San Francisco, California

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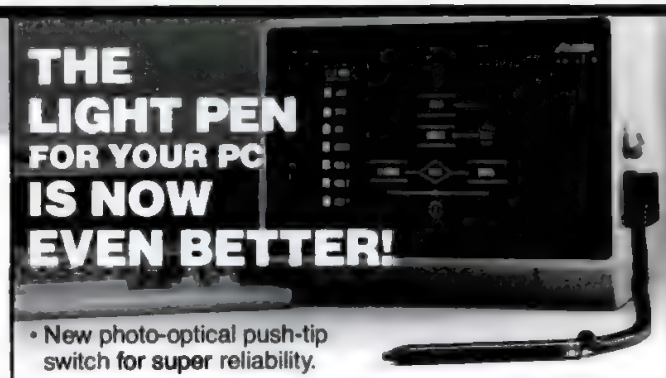
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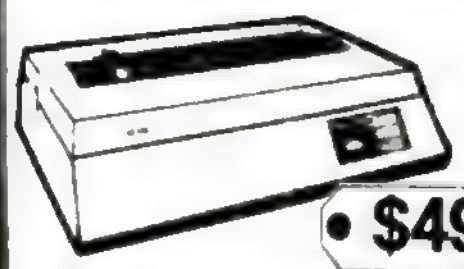
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```
500                                RANDOMIZE
VAL(MID$(TIME$,4,2))
*100+VAL(MID$(TIME$,7,2))
```

This statement uses the time of day as the seed for the BASIC random number generator. In principle, it is no different from the counter suggested by Paul Burck in the July, 1983 issue; it simply uses the PC's internal clock as the counter. The advantage is that only a single program line is required and no variables are defined.

Programs that are often booted and automatically started may not work well with this method if the RANDOMIZE statement is too close to the top of the program, particularly when they are run on PCs without a battery-operated clock. This is because, in the absence of a battery-operated clock, the PC's time of day is reset every time the system is booted. The value of the TIME function, therefore, will tend to be the same number from run to run unless the RANDOMIZE function appears after an on-screen question asked of the user.

Jan B. Young
Port Washington, Wisconsin

Here is another entry in our continuing saga of ways to seed the random number generator in BASIC. It works; do with it what you will.

Program Performs Print Screen

I have discovered an interesting tip to pass along to your readers.

Using IBM PC BASIC 2.00, it is possible to duplicate the function of the Ctrl-PrtSc key combination under program control.

To turn ON echo of screen output to the printer:

```
DEF SEG : POKE &H758, &HFF
```

To turn this printer echo OFF:

```
DEF SEG : POKE &H758, 0
```

Ken Snapp
Denver, Colorado

Sorry, all you PC-DOS 1.1 users. This only works with BASIC 2.00 under PC-DOS 2.0. Is that good enough to make you switch?

Toggling Ctrl and ALT

In "PC-Tutor" in the June issue of PC, there was a letter submitted by Dal Vordahl, a handicapped person who cannot use the PC's keyboard because he can only type with one hand. He requires the control and alt keys to "toggle" as NumLock and Caps Lock do. My partner and I had just started our own small software business when we saw this letter and considering that a single assembly language pro-

Figure 3: Karl Mueller's program to convert Ctrl and Alt to toggle keys.

```
LOCK.BAS - PROGRAM TO CONVERT CONTROL AND ALT TO TOGGLE KEYS

10 '                    LOCK.BAS
20 '  Produced for Dal Vordahl by M+M Software
30 '       program written by Karl Mueller
40 '
100 CLS:PRINT"Working...."
110 FOR A=1 TO 109
120     READ B
130     Q=Q+B
140 NEXT A
150 IF Q=11567 THEN 180
160     BEEP:PRINT:PRINT"Bad Data - Check Your Typing"
170     PRINT:END
180 OPEN"LOCK.COM" AS 1 LEN=1
190 FIELD 1,1 AS A$
200 RESTORE
210 FOR A=1 TO 109
220     READ B
230     LSET A$=CHR$(B)
240     PUT 1,A
250 NEXT A
260 CLOSE:PRINT:PRINT"LOCK.COM created":PRINT:END
270 '
280 DATA 235,94,144,251,156,14,46,255,54,93,1,80,83,81,82,86,87,30,6,252
290 DATA 184,64,0,142,216,228,96,80,228,97,138,224,12,128,230,97,134,224
300 DATA 230,97,88,138,224,60,29,116,35,60,56,117,18,128,54,23,0,8,246
310 DATA 6,23,0,8,117,6,184,184,184,235,9,144,60,184,116,14,60,157,116
320 DATA 10,234,168,233,0,240,128,54,23,0,4,234,94,234,0,240,207,92,1
330 DATA 0,186,3,1,184,9,37,205,33,186,96,1,205,39
```

gram could mean such a great deal to a person, we set out to accomplish the task. Figure 3 is a BASIC program, which will create a .COM file to convert the Ctrl and Alt keys into toggle keys (see Figure 4).

After the BASIC program LOCK.BAS has finished running, there will be a new file on your diskette: LOCK.COM. When you boot up into DOS, make sure this file is on your diskette and just type LOCK (or include LOCK as a line in your AUTOEXEC.BAT file). When the program is finished, Ctrl and Alt behave like toggle keys until the system is rebooted.

Note: This program takes up a small amount of memory—less than one half K. However, if you already have the bare memory requirements for some programs (such as *WordStar*), they will not run until you install more memory or reboot without using LOCK. Note also that since this program creates a new keyboard interrupt, it is not compatible with other programs which do the same (Prokey, for example) unless modified. If you have a problem like this, send both programs to M+M Software, Sky Oak Dr., Bradford Woods, PA 15015, and we will make them compatible.

We wish Dal the best of luck and hope he finds this program useful. Please place it where he may see and use it.

Karl Mueller
Bradford Woods, Pennsylvania

Thank you for this program. It will open up new PC vistas to many people. We appreciate and applaud your humanitarian interests. Just a note of caution: While this program works well for PC-DOS 1.1, it does not work under PC-DOS 2.0 or, for that matter, on PC-XT at all, probably due to differences in the ROM.

Figure 4: The program execution of Karl Mueller's toggle for Ctrl and Alt.

```
  ...o IBM Personal Computer Assembler 06-30-83          PAGE   Symbols-1
LOCK.ASM   TOGGLE FOR CONTROL AND ALT


Segments and groups:

                N a m e             Size    align   combine class

BIOS . . . . . . . . . .            EASE    AT      F000
CSEG . . . . . . . . . .            0160    PARA    NONE
DATA . . . . . . . . . .            0017    AT      0040

Symbols:

                N a m e             Type    Value   Attr

D_INT. . . . . . . . . .            L FAR   E900    BIOS
C1 . . . . . . . . . . .            L NEAR  0145    CSEG
C2 . . . . . . . . . . .            L NEAR  0140    CSEG
D_RET. . . . . . . . . .            L FAR   EA5E    BIOS
E1 . . . . . . . . . . .            L NEAR  0157    CSEG
INIT . . . . . . . . . .            L NEAR  0160    CSEG
KB_FLAG. . . . . . . . .            L BYTE  0017    DATA
KB_INT . . . . . . . . .            F PROC  0103    CSEG    Length =005C
MARK . . . . . . . . . .            L WORD  0150    CSEG
SPACE. . . . . . . . . .            L BYTE  0160    CSEG
START. . . . . . . . . .            L NEAR  0100    CSEG
T1 . . . . . . . . . . .            L NEAR  0152    CSEG
T_EXIT . . . . . . . . .            L NEAR  015C    CSEG

Warning Severe
Errors  Errors
0       0

 The IBM Personal Computer Assembler 06-30-83          PAGE   1-1
LOCK.ASM - TOGGLE FOR CONTROL AND ALT

                        TITLE   LOCK.ASM - TOGGLE FOR CONTROL AND ALT
                        PAGE    ,132
                        ;-----------------------
                        ; MODULE DESCRIPTION
                        ;-----------------------
                        COMMENT @               LOCK.COM

                                THIS PROGRAM WILL CONVERT THE CONTROL AND
                                ALT KEYS INTO TOGGLE KEYS

                                THE PROGRAM INSTALLS A NEW KEYBOARD INTERRUPT
                                ROUTINE WHICH RIDES "PIGGY BACK" ON THE ONE
                                ALREADY IN ROM

                                THE ROUTINE INTERCEPTS ALL CONTROL AND ALT
                                CODES COMING FROM THE KEYBOARD AND HANDLES
                                THEM INTERNALLY.  ALL OTHER CODES ARE PASSED
                                ON TO THE INTERRUPT ROUTINE IN ROM @
                        ;
                        ;-------------------------
                        ; ASSEMBLER INITIALIZATION
                        ;-------------------------
                        ;
                        ;------ ENTER SEGMENT LABELS
                        ;
0000                    DATA    SEGMENT AT 40H
0017                            ORG     17H
0017                    KB_FLAG LABEL   BYTE
0017                    DATA    ENDS
                        ;
0000                    BIOS    SEGMENT AT 0F000H
E900                            ORG     0E900H
E900                    D_INT   LABEL   FAR
E05E                            ORG     0E05EH
E05E                    D_RET   LABEL   FAR
E05E                    BIOS    ENDS
                        ;
                        ;------ INITIALIZE CODE SEGMENT
                        ;
0000                    CSEG    SEGMENT
                                ASSUME  CS:CSEG
0100                            ORG     100H
0100                    START:
0100 EB 3E 90                   JMP     INIT
0103                    KB_INT  PROC    FAR
                        ;
                        ;-----------------------------
                        ; REPLACEMENT KEYBOARD ROUTINE
                        ;-----------------------------
                        ;
                        ;------ SET UP DUMMY STACK AND CONDITIONS
                        ;
                                ASSUME  DS:DATA

The IBM Personal Computer Assembler 06-30-83          PAGE   1-2
LOCK.ASM   TOGGLE FOR CONTROL AND ALT

0103  FB                       STI
0104  9C                       PUSHF
0105  0E                       PUSH    CS
0106  E8 5E 0150 R             PUSH    CS:MARK
0109  50                       PUSH    AX
010A  57                       PUSH    BX
010B  51                       PUSH    CX
010C  52                       PUSH    DX
010D  56                       PUSH    SI
010E  57                       PUSH    DI
010F  1E                       PUSH    DS
0110  06                       PUSH    ES
0111  FC                       CLD
0112  A0 ---- R                MOV     AX,DATA
0115  8E D8                    MOV     DS,AX
                        ;
                        ;------ READ IN KEY
                        ;
0117  E4 60                    IN      AL,60H
0119  50                       PUSH    AX
011A  E4 61                    IN      AL,61H
011C  8A E0                    MOV     AH,AL
011E  0C 80                    OR      AL,80H
0120  E6 61                    OUT     61H,AL
0122  86 E0                    XCHG    AH,AL
0124  E6 61                    OUT     61H,AL
0126  58                       POP     AX
0127  8A E0                    MOV     AH,AL
                        ;
                        ;------- PROCESS KEY
                        ;
0129  3C 1D                    CMP     AL,29
012B  74 23                    JZ      T1
012D  3C 38                    CMP     AL,56
012F  75 12                    JNZ     C1
                        ;
                        ;------- ROUTINE TO HANDLE ALT KEY
                        ;
0131  80 3E 0017 R 08          OR      KB_FLAG,08
0136  F6 06 0017 R 08          TEST    KB_FLAG,08
013B  75 06                    JNZ     C1
013D  BE ----                  MOV     AX,0000H
0140  EB 09 90                 JMP     C2
0143                    C1:
0143  3C 80                    CMP     AL,56+80H
0145  74 0E                    JZ      E1
0147  3C 99                    CMP     AL,29+80H
0149  74 08                    JZ      E1
                        ;
                        ;------- PASS KEY ON TO ROM RESIDENT ROUTINE
                        ;
014B                    C2:
014B  EA E900 ---- R            JMP     FAR PTR D_INT

The IBM Personal Computer Assembler 06-30-83          PAGE   1-3
LOCK.ASM   TOGGLE FOR CONTROL AND ALT

                        ;
                        ;------ TOGGLE CONTROL
                        ;
0152                    T1:
0152  80 36 0017 R 04          XOR     KB_FLAG,4H
                        ;
                        ;------- POSTBAD NOTHING HAPPENED
                        ;
0157                    E1:
0157  EA EA5E ---- R            JMP     FAR PTR D_RET
                        ;
                        ; ------ RETURN FROM INTERRUPT
                        ;
015C                    T_EXIT:
015C  CF                        IRET
015D  0150 R            MARK    DW      OFFSET T_EXIT
015F                    KB_INT  ENDP
                        ;
                        ;-----------------------------
                        ; INSTALL REPLACEMENT ROUTINE
                        ;-----------------------------
0160                    INIT:   ORG     $+1
0160                    SPACE   LABEL   BYTE
                                ASSUME  DS:CSEG
0160  8A 0103 R                MOV     DX,OFFSET KB_INT
0163  B8 2509                  MOV     AX,2509H
0166  CD 21                    INT     21H
0168  BA 0160 R                MOV     DX,OFFSET SPACE
016B  CD 27                    INT     27H
016D                    CSEG    ENDS
                                END     START
```

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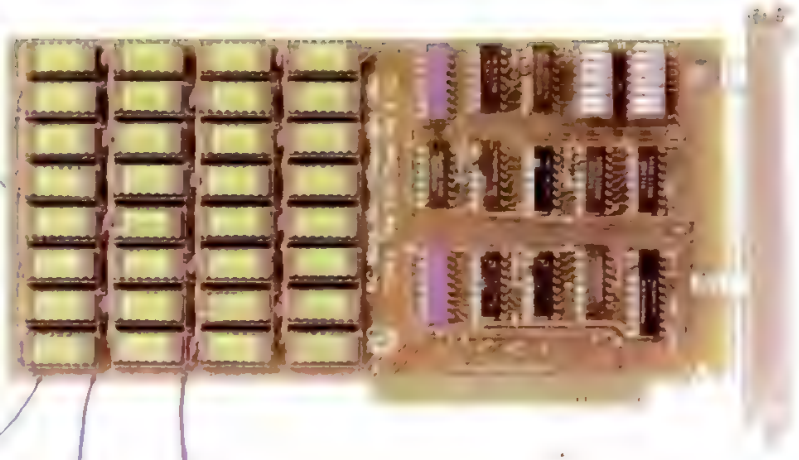
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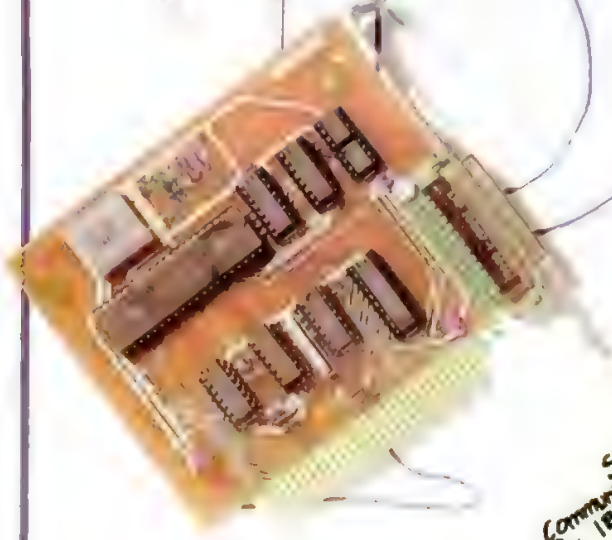
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CIRCLE 347 ON READER SERVICE CARD

Small manufacturers have found that riding the tail of the comet can be an exhilarating business feat, but staying on requires marketing prowess.

Second-Hand Success

An incredible number of success stories surround the IBM PC. Microsoft is probably at the top of the list, but then, it was a class act before the PC; the association with IBM simply has given the company's bottom line a hefty kick. Still, give Microsoft credit for acting quickly and so well.

Most of the other stories, though, involve smaller firms, many of which did not exist on August 12, 1981. You can leaf through the pages of this magazine and find many of them. Compare their ads in this issue with their ads a year or 18 months ago. In many cases there will be a striking difference.

It should come as no surprise that a lot of folks saw the announcement of the PC as a new wave that they wanted to ride. For quite a few, their rapid perception has paid off handsomely. Think about a company that starts from zero and 2 years later has revenues of $30 million. AST Research and Davong Systems fit into that category. And they have reputations to match their revenues, too.

For others, it was simply a matter of converting a software product designed for some other computer to the PC. For many of these companies, sales of the PC version outsell the original by factors of two, three, or more to one, and not in units, but in dollars! When you consider that most PC products sell at about one-tenth the price of their minicomputer counterparts, it's not hard to see that these companies are riding high.

THINK ABOUT a company that starts from zero and 2 years later has revenues of $30 million.

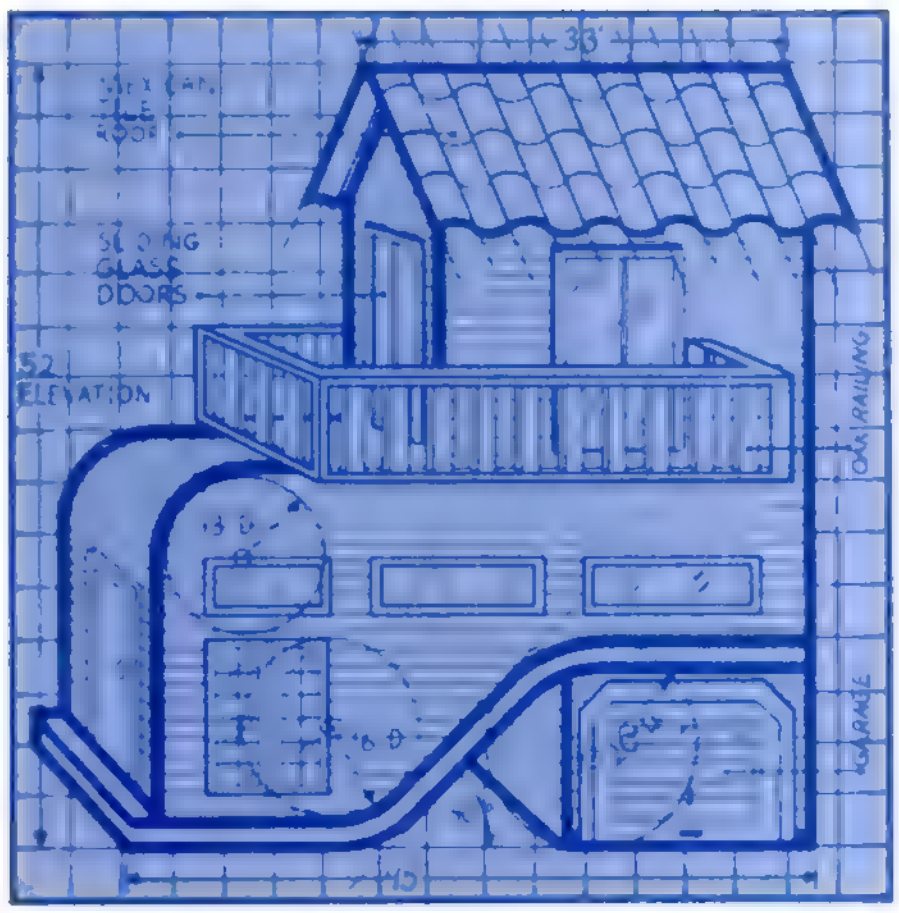
Our advertising in *PC Magazine* may be the absolute measure of the size and success of the PC aftermarket. These third-party suppliers (IBM is the first party; you, the PC buyer, are the second) are quick, smart, competitive, aggressive, and tough, and there are a lot of them.

Hand-Me-Downs

As successful as the aftermarket is, however, it must remember that it owes something to IBM. It is a second-hand success. If that doesn't send shivers up and down your spine, it should, because IBM is, and always has been, a force to be reckoned with.

History serves to underscore the point. IBM is behaving now just as it has throughout its spectacular existence. It

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CIRCLE 301 ON READER SERVICE CARD

markets hard and well. Now that the shackles of the antitrust suit have been removed, and now that AT&T has been "deregulated," IBM has become even more competitive. As this meant trouble for the mainframe vendors of old, so it

THE aftermarket must remember that it owes something to IBM.

does for the aftermarket today. Interestingly enough, tales of these happenings have been played out over such a short period of time that we easily can look back and remember what happened.

Consider the original 64K PC. Remember what the first add-in product was? Right. Memory boards came bounding out of the blue from companies no one had heard of. Then somebody counted the slots in the system and thought, "Heck, there ain't that many!" and the multifunction card business took off.

IBM, with their miserly 32K and 64K add-in boards, reacted. Not right away, mind you, but soon enough. By early this year, IBM PCs and XTs all had 256K on the motherboard, more than enough for almost any application. At that instant, a bunch (as in more than a few but not all) of these memory-board manufacturers gave up the ghost. Perhaps they had just gotten started and could not afford to invest in R&D for another product. Perhaps they didn't have the foresight of some other firms. Whatever the reason, an IBM marketing decision had cut them out.

The multifunction board manufacturers got hurt too. With 64K now standard and up to 256K available from the original vendor, the user couldn't necessarily see the need for additional memory. Prices came crashing down, and a new wave of products was introduced, mostly of the everything-you'd-want-on-a-multifunction-card-except-the-memory variety.

A few companies were watching this carefully and took slightly different action. LNW and Maynard, for example, have introduced products that have no personality at all. You must order their

basic boards and specify the exact options you desire. These are then plugged onto the baseboard and, voilà, a customized multifunction board. Both these boards are a little more expensive than average, though, and one is led to believe they were designed to protect their companies' ability to offer products that matched whatever the current need, whatever the current IBM configuration.

A SMALL company has to have a significant price advantage over the IBM alternative.

AST and STB took a different tack. They both built boards with room for 384K of memory and one of just about everything else you can think of, including a game adapter. The trick is the board's capacity for RAM, which, when added to the base 256K PC, brings the amount of memory up to 640K, the PC's stated maximum. Although both companies had products that could be expanded to as much as 512K, they had trouble explaining how a 768K machine might work, given an IBM/DOS limit of 640K. Further, the price of these boards ($395 with 64K installed) is very, very low.

The Moral of the Story

What do we learn from all of this?

Lesson 1: IBM can make a very simple change to its product (such as an upgrade to 256K) that will send a tidal wave through the aftermarket. The folks competing out there, especially those in the smaller firms, have to be on constant alert to be sure they are prepared for the almost inevitable changes. Attention to cash flow and R&D expenditures is critical, because a new product may have to be devised virtually overnight to protect a firm's market share.

Lesson 2: An aftermarket company has to have a strong marketing capability. When IBM announces something that endangers a firm's product line, the smaller firm has to be ready to explain why its product is still a better or more effective choice. The same marketing team has to be responsive to shifts in the aftermarket to be sure the development teams are working on the right new products and that they will be able to be successfully marketed once announced.

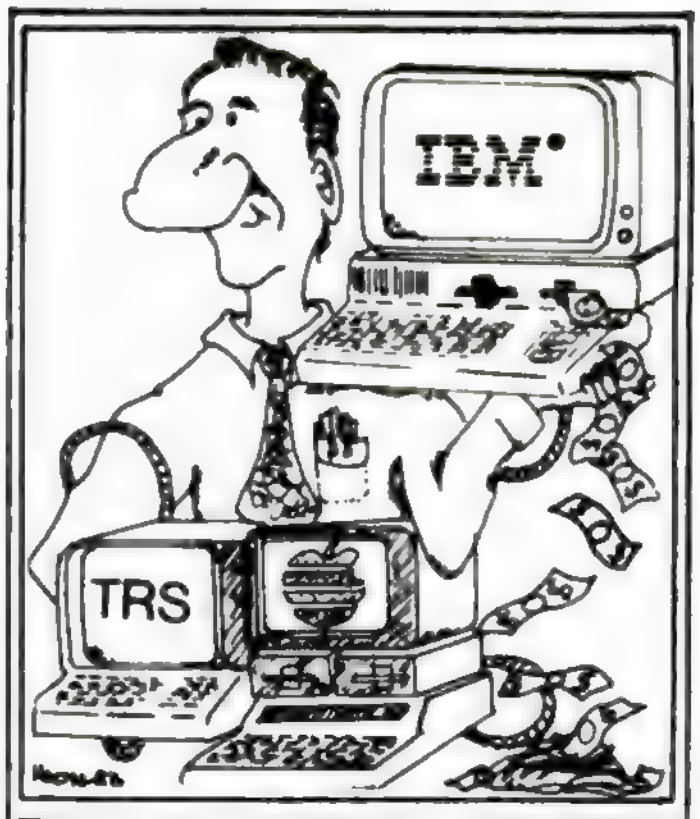
Lesson 3: A small company has to have a significant price advantage over the IBM alternative. In the past, IBM's competitors had to offer at least a 20 percent reduction in price and deliver more function to boot! The same seems to be holding true with regard to the PC. A little marketing savvy has to be used as well. There has to be room for the price to move downwards when pressed by an IBM announcement, without causing all the margin to evaporate. In our multifunction card example, consider that every manufacturer also delivers electronic-disk and print-spooler software.

Lesson 4: Whatever product is offered, the company must be able to explain it. Memory and multifunction cards didn't take much explanation; most people can count. The more complicated ones must be explained very carefully, and in terms the buyers (and the sellers, in fact) can understand. Remember one thing: only IBM can get away with limited explanations.

Lesson 5: A product must be innovative within its lifespan. A company introducing a multifunction card now (with the exception of IBM) better have a *really* good story. Furthermore, the company must have the resources to deliver the new product within its useful lifespan or the development effort will have been wasted. Sometimes, this can be a real strain on capital and, of course, on staff.

ONLY IBM can get away with limited explanations.

Although second-hand success might sound as if it implies no more than jumping on the coattails of that giant party of the first part, it's almost a certainty that a third-rate company won't make it for long. The short history of the IBM PC tells us that it takes the right stuff for PC-aftermarket companies to succeed. */PC*



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CIRCLE 357 ON READER SERVICE CARD

Coming Up in *PC Tech Journal*

C and PC

Part I of a two-part, 10-compiler review. In this issue, the first five: Lattice C, Microsoft C, C86 from Computer Innovations, and more.

Inside Microsoft BASIC

How one BASIC-to-8088 translator works, plus predictions about the next release of Microsoft BASIC.

Etherseries

An in-depth look at 3Com's Ethernet-based LAN. Our writer lays out the parts of the network and explains how each functions.

Interrupts and the IBM PC

The first part of this two part article describes the PC's interrupt system, filling in a gap in IBM's documentation. The 8295A is revealed.

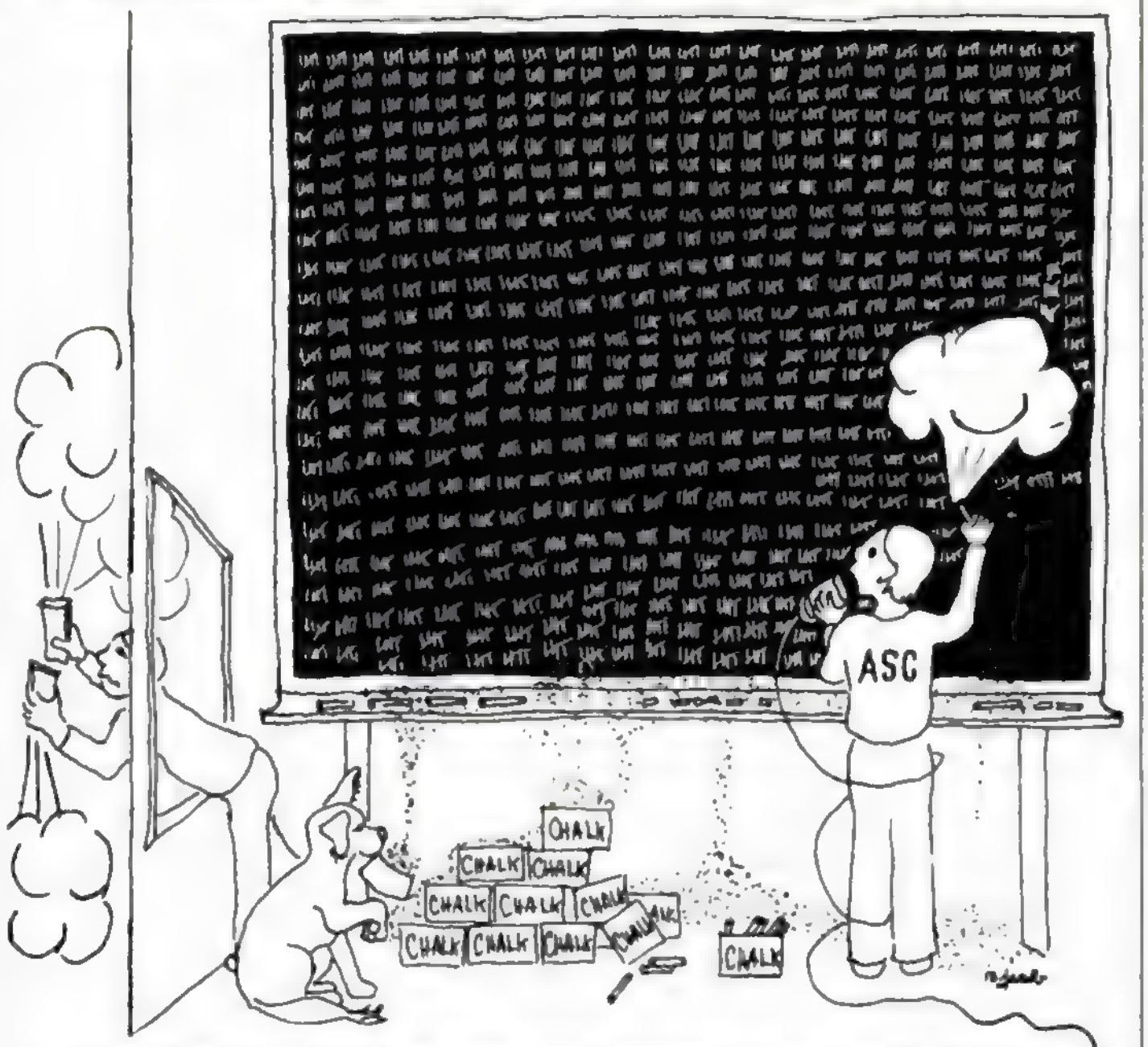
Graphic Reviews

The pros and cons of four color boards, including Universal Research MultiDisplay Adaptor, Amdek Multiple Adapter Interface, and Tecmar PC-Mate, plus reviews of two monochrome boards.

Stretch PC

Reviews of expansion chassis from Tecmar and IBM, comparing configurations for performance and price.

15K MEMBERS AND GROWING

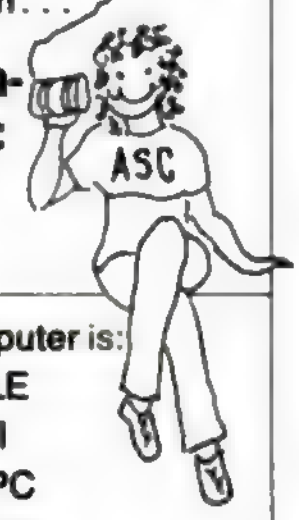


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